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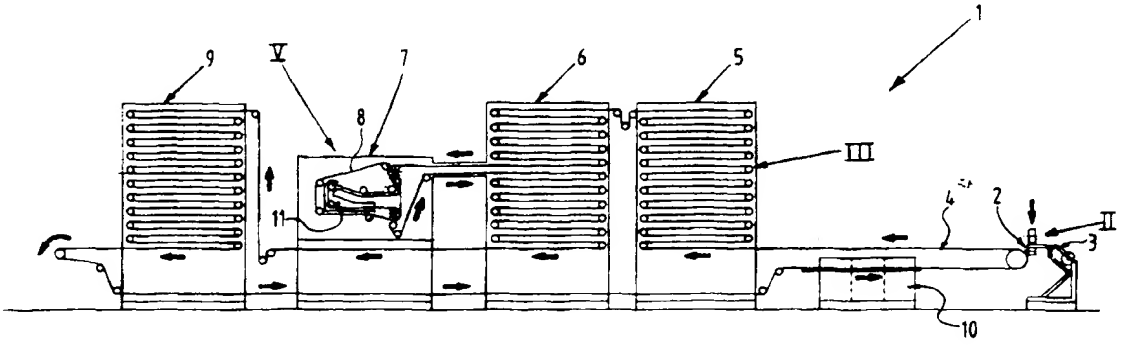

(57) Abstract

The invention relates to a transporting device for transporting food products to be subjected to a processing, comprising at least one advancing element for advancing carriers for the food products for processing fixed to the advancing element along a route extending through a processing space, and guide means for guiding the carriers along at least a part of the route. The invention also relates to a carrier comprising wire mesh arranged on its sides extending transversely of the direction of movement, wherein the carriers are provided with guide elements for use in such a transporting device. The invention further relates to a composite transporting apparatus comprising at least two transporting devices for transporting food products for processing, wherein both transporting devices are coupled by a collective transfer device.

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TRANSPORTING DEVICE FOR FOOD PRODUCTS

The invention relates to a transporting device for transporting food products to be subjected to a processing, comprising at least one advancing element for advancing carriers for the food products for processing fixed to the advancing element along a route extending through a processing space.

Such transporting devices are generally known. The advancing element herein provides not only the forward movement of the carriers but also guiding of the carriers. This entails an additional mechanical load on the advancing element, for instance due to a bending moment, whereby it is more susceptible to wear. High demands are therefore made of the advancing element, whereby the possible choices of material from which the advancing element is manufactured, the type of advancing element and the dimensioning of the advancing element are limited. Such limitations often conflict with other requirements set for such devices, for instance in respect of hygiene and corrosion resistance. The invention now has for its object to provide a solution to the above stated drawbacks.

This object is achieved by such a transporting device which is provided with guide means for guiding the carriers along at least a part of the route.

As a result of these measures the advancing element will be less heavily loaded, whereby it is possible to give the advancing element a light form and to make use for instance of stainless steel and/or lubrication-free chains instead of steel and/or lubricated chains. A greater structural freedom moreover results from the separation of functions.

According to a first preferred embodiment the advancing element is endless and the route is closed. It

will be apparent that herewith a continuous movement can be realized with all the resulting advantages.

In some situations it is attractive to give the route a linear form. The advancing element is then adapted to transport the carriers alternatingly in opposing directions. This results therefore in discontinuous use.

According to another preferred embodiment the guide means are adapted to take the weight of the carriers.

The forces exerted on the advancing element are hereby further decreased.

According to yet another preferred embodiment the transport apparatus comprises secondary guide means for only guiding the advancing element.

This avoids lifting of the advancing element or a less favorable positioning of the carriers, in particular with co-operation between the guide means for the carriers, and the secondary guide means for the advancing element.

According to yet another embodiment the carriers are mounted rotatably on the advancing element. This provides the option of effecting regular changes in the position of the carriers in order to prevent burning phenomena in food products.

This is preferably achieved by adapting the guide means to determine the rotation position of each of the carriers subject to the position of the carrier.

This provides the option of determining the rotation position of the carriers subject to their position, thus enabling a constant process flow.

According to yet another preferred embodiment the route extends through at least a second processing space and the first and second processing spaces are connected by a tunnel, the length of which is at least as large as the maximum distance between the carriers in the direction of movement. According to this preferred embodiment the dimension of the tunnel in a plane transversely of the direction of movement is less than

1.5 times the dimension of the carriers, including possible products present on the carrier, in this direction.

This results in a good separation between the first and second processing spaces. This is important when different substances are being used in the first and second processing spaces and differing atmospheres prevail therein.

According to a structural embodiment the advancing element comprises at least one spring belt.

The use of a spring belt results in an attractive embodiment in respect of food products, since a spring belt requires no lubricants.

According to another embodiment the advancing means comprise at least one chain provided with hollow links, wherein each of the carriers is provided with a protruding part extending into a hollow link.

These measures result in free rotation of the carriers relative to the advancing means. The position of the carriers can herein be controlled independently of the advancing means.

According to yet another structural embodiment the carriers each comprise wire mesh on their underside and their sides extending transversely of the direction of movement.

The use of wire mesh, which is understood to mean a structure which is for a relatively greater part open whereby the carrier acquires the configuration of a basket, provides the option that the food product for processing present in the basket is easily approachable from as many sides as possible, for instance by liquids, vapours or gases, in the processing spaces. The good accessibility results in a shorter residence time in the relevant spaces and thus in a higher production speed. Another advantage of the use of a basket is that, particularly in the case of vulnerable food products, they are supported over a large part of their surface.

According to a preferred embodiment the sides extending parallel to the direction of movement comprise at least substantially closed walls.

This leads to a sturdy construction of the carrier with good potential for fixing to the advancing element.

According to yet another preferred embodiment the carriers are provided on their sides with guide elements for guiding of the carrier into a determined position by the guide supports. The guide elements can for instance be formed by guide edges arranged on the outside of the carriers.

As a consequence of this measure it is possible for the rotation position of the carrier to be determined subject to its position along the route. This provides the option for instance of allowing the carrier to variously assume different rotation positions during processing so that, depending thereon, different parts of the product present in the carrier are exposed to the processing devices.

According to another preferred embodiment the guide supports are displaceable for changing the position of the carriers.

The positions of the carrier can herewith be optimized, depending for instance on the process and/or the product.

The invention also relates to a carrier suitable for use in a transporting device as described above.

Use is preferably made for this purpose of a carrier comprising wire mesh arranged on its sides extending transversely of the direction of movement, wherein the carrier is provided with guide elements. A guide edge represents a simple embodiment of such a guide element.

The use of wire mesh results in the forming of a basket with a high degree of access. It is important

herein that the wire mesh be manufactured with a passage ratio greater than 65%.

The invention also relates to a carrier for food products, for instance as according to claims 17-19, comprising wire mesh for supporting the food products. In such carriers applied heretofore the accessibility of the product is limited by the contact surfaces existing between the wire mesh and the product. This can manifest itself in markings occurring on the product at that position. Such marking phenomena are now limited by making use of woven wire mesh. This advantage is not limited to a carrier as according to any of the claims 17-19.

The wire mesh is preferably manufactured from a material with a thermal conduction coefficient of a maximum of 0.25 $W K^{-1} m^{-1}$.

This latter embodiment is particularly important when the processing devices subject the food product for processing, and thereby also the carrier, to a temperature treatment. If this has to act for only a short time duration, it is possible that the basket will heat up quickly and, during the subsequent process taking place at a different temperature, the product is still exposed to the previous temperature, which will result in a decrease in quality.

Plastic mesh, for instance polyester mesh, can usually be applied advantageously.

An attractive embodiment is obtained when the wire mesh is received in containers on its edges extending transversely of the direction of movement. This results in an attractive construction because sharp edges of the wire mesh are avoided and damage to the products is thus unlikely.

In preference the containers are releasably connected to the guide elements. This provides the option, in the case of possible defects such as wear, of rapid replacement of the guide elements which, as a

consequence of their guide function, are susceptible to wear.

It will also be apparent that with the use of plastic walls in the carrier an attractive and inexpensive embodiment can be obtained.

The invention further relates to a guide element suitable for use with a carrier as according to claim 24.

The invention also relates to a composite transporting apparatus comprising at least two transporting devices for food products for processing, for instance as elucidated above, wherein the transporting devices are coupled by a collective transfer device.

Such a situation is applicable for instance when the products must be exposed to an aggressive environment. The processing device in which this aggressive environment prevails is therefore provided with a separate transporting device. Coupling of both transporting devices avoids the whole transporting apparatus being subjected to the aggressive environment.

Such a transfer device is preferably formed by a route of both transporting devices which extends partly parallel, wherein the guide means in the parallel routes are adapted to determine the position of the carriers so that the content of the carrier of the first transporting device is moved to a carrier of the second transporting device.

It will also be apparent that the movements of both transporting devices must herein be synchronized.

The route of both transporting devices preferably extends such that the content of the carrier is moved from the first transporting device to the second transporting device.

When the guide means are adapted to determine the rotation position of the carriers of the first transporting device and the second transporting device on the basis of the angle of arc, a gradual change of angle

is obtained so that the products can be displaced from the one carrier to the other carrier without the danger of damage.

In some situations, for instance when an interposed processing device with an aggressive atmosphere is used, it is attractive that, in addition to a first transfer device for transferring the food products from the first transporting device to the second transporting device, a second transfer device be used for transferring the food products from the second transporting device to the first transporting device.

This therefore results in almost complete isolation of the second transporting device which can be fitted for transport through the aggressive environment of the products for processing.

The invention further relates to a loading device for loading a food product fed by supply means to the loading device into a carrier of a transporting device, for instance a carrier forming part of a transporting device as according to claims 1-15 or a carrier as according to claims 16-25, comprising transfer means for displacing the food product from the supply means into the carrier.

Such a device is known from DE-A-44 10 391. This patent application describes a loading device wherein sausages from a sausage manufacturing machine are fed to buffer baskets, from which the sausages drop into baskets located thereunder through rotation of the buffer baskets on their longitudinal axis. This drop entails the risk of the food product being damaged. It is moreover not possible with this device to load the sausages selectively in carriers. The invention now has for its object to obviate these drawbacks.

For this purpose the loading device is characterized in that the transfer means comprise a slide element which is drivable by drive means along a closed route and the route comprises a part wherein a food product fed by the supply means is displaced by the slide

element into the carrier. The use of a slide element provides the option of causing the loading to be accompanied by a lower mechanical load on the food product.

The possibility therefore also results of allowing the loading device to operate selectively, for instance to allow passage of reject sausages or when two or more transporting devices are placed in parallel.

Use is preferably made of a loading device wherein the slide element follows a path located in a vertical plane as it follows the route.

This provides the option, if the food products are fed from a lateral direction, of moving the slide element along above the products still to be moved into the carrier after the products for processing have been moved by the slide element into the carrier, whereby a large loading capacity can be realized.

According to yet another embodiment the route comprises a substantially horizontal part wherein the slide element shifts the food product. A simple displacement of the food product is hereby obtained without excessive forces being exerted thereon, so that the chance of damage is as small as possible.

This danger is further decreased by providing the slide element with a scoop element on its bottom edge.

The measure wherein the slide element is initially accelerated and subsequently slowed during the substantially horizontal part of the route also contributes to a small chance of damage.

According to yet another preferred embodiment the slide element is connected to a driven support by means of a connection such that during a part of the route the slide element substantially covers the container of the transporting device.

This measure ensures that in the case of a product with a slightly resilient structure, rebounding

and bouncing of the product out of the carrier is avoided.

This effect is improved, when the slide element comes to a standstil during the covering.

The measure that the support is connected by means of a rod assembly to a crank drivable in rotation also results in an attractive, mechanically simple embodiment.

The loading device is preferably provided with a supply device which is formed by a conveyor belt extending transversely of the transporting direction of the transporting device.

The invention also relates to a production device for producing food products, comprising a production member with an at least partially curved configuration and transporting means which are formed for instance by supply means as stated in any of the claims 32-40 which connect onto the production member. Such production devices are encountered for instance in sausage manufacture, wherein the sausages coming from the production member are fragile and it is important that they come to lie on a conveyor belt in controlled manner after manufacture, wherein they are prevented from making a free-fall by which they could be damaged. For this purpose the production member according to the invention is characterized in that the transporting means are at least partially curved together with the production member.

This is particularly the case when the production member is formed by the crimper wheel of a sausage manufacturing apparatus.

Finally, the present invention relates to a sausage manufacturing apparatus comprising a transporting device, wherein the processing device is formed by a drying device.

The second processing device is then usually formed by a smoking device.

Preferably, the sausage manufacturing apparatus comprises a bending device for bending the sausages.

This offers the possibility to make bended sausages, for instance with the shape of a horse shoe.

To emphasize the flexibility of the production the bending device is prepared for selectively bending or not bending a passing sausage.

Preferably, the sausage bending device is preceded by a positioning device for positioning the sausages. This provides in the feature that the sausages are bended in the middle, so that the shape of the sausages becomes symmetric.

The invention also concerns a processing apparatus for subjecting products, for instance food product by the processing of a fluid, the apparatus comprising carriers movable along a path, a housing through which the path extends itself and flowing means for making fluid flow through the path, in which the path of the carriers extends according to a zigzag through the housing, and in which the partial paths of the path extends substantially horizontally.

With these features it becomes possible to enhance the effectiveness of the contact between fluid and product. It is indeed easier to make the fluids flow homogeneously in a vertical direction than in a horizontal direction. The cross-like movement of the fluid like gas and product is than used optimally, so that no unused paths of the fluid flow can develop. Further, this features offers the possibility to use in parallel flow or in counter flow; the products use - besides the horizontal zigzag movement - slowly upwards or downwards.

Preferably the apparatus comprises at least two housings, and the direction of movements, perpendicular to the plain of the partial path in adjacent housings extends in opposite directions.

This avoids extra vertical movements between the housings.

The described inventions can be applied during several processes of food products, like drying, steam cooking, cooking, cooling, after drying.

Preferably, different process conditions prevail in the housings.

This enhances the flexibility of the apparatus.

Preferabely, separation means are provided between the housings.

This feature leads to a better process control. This is also valid when two different housings are used.

The present invention will be elucidated hereinbelow with reference to the annexed drawings, in which:

figure 1 shows a schematic view in longitudinal section of a device according to the invention;

figure 2 shows a partly broken away perspective detail view along arrow II in figure 1;

figure 3 shows a partly broken away perspective detail view along arrow III in figure 1;

figure 4 shows a perspective view of a basket according to the invention;

figure 5 shows a view in longitudinal section of the sub-device indicated with V in figure 1;

figure 6 shows a view similar to figure 5 of a variation of the partial apparatus depicted in figure 5;

figure 7 shows a perspective view of a positioning apparatus;

figure 8 shows a perspective view of a bending apparatus; and

figure 9 shows a perspective view of a drying basket-positioning apparatus.

In figure 1 is shown a sausage preparing apparatus designated in its entirety with 1. The sausage preparing apparatus comprises a co-extrusion device not shown in the drawing which is per se known. Such a co-extrusion device produces a continuous string of sausage material, the interior of which is formed by the filling

or the stuffing which is provided by the co-extrusion device with a skin.

Using a so-called crimper, which will be discussed briefly below with reference to figure 2, this continuous string is divided into separate sausage units. These are fed onto a conveyor belt which is designated 2 in figure 1 and of which the direction of movement extends transversely of that of the drawing.

The sausage units are subsequently moved to a transporting device 4 using a transfer device 3. This transporting device 4 extends initially through a first processing housing 5 and then through the upper part of a second processing housing 6. The transporting device then passes through a part of a third processing housing 7 which is adapted to process the product in an aggressive environment. For this purpose this processing housing is provided with a separate transporting device 8. The transporting device then passes through the lower half of the second processing housing 7, under the third processing housing 7 and finally through a fourth processing housing 9.

The thus processed sausages are thereafter unloaded in an unloading station which is not further elucidated, whereafter the main transporting device passes through a cleaning device 10 back to the transfer device 3.

When such a device is used as device for preparing sausage, the second processing housing 6 is formed for instance by a housing in which a different or the same temperature prevails, for instance due to the presence of heating elements or by supplying heated gases to this housing. A further drying of the sausages takes place here.

In the third processing housing 7 the sausages for processing are subjected to a taste-improving environment; they are herein treated for instance with smoke liquid. This liquid is generally quite aggressive, so that a separate space 11 is created for this purpose.

In order to prevent contamination of the main transporting device use is made herein of a second transporting device which extends only inside this third processing housing. The aggressiveness and contamination of space 11 therefore affect only this second transporting device, so that the main transporting device is protected.

The product is subsequently subjected to the lower half of the second processing housing 6 in which the drying process is completed.

Finally, a further cooking or cooling process takes place in the fourth processing housing 9.

It will be apparent that this total apparatus can be modified in accordance with the nature of the product for processing. The above stated embodiment relates to the processing of sausages, for instance frankfurters; it is however quite possible for such a processing apparatus to be used for the processing of other products, such as other types of sausage or other meat products such as hamburgers and the like. The invention is not however limited to applications in the meat sector; such an apparatus can also be used in for instance the preparation of vegetable preserves.

Figure 2 shows a sausage string from a co-extrusion mechanism which is not shown in the drawing. In the present embodiment this is supplied from above in vertical direction; it is equally possible for it to be supplied from another side in order to have available a larger circle segment for processing by the so-called crimper wheel 13.

This crimper wheel 13 is provided on its periphery with crimping elements 14 which engage on and clamp the sausage string and bind together the casing of the sausage string at the position of the clamping and then cut the thus formed sausages 15 free of each other.

Arranged under crimper wheel 13 is the transverse conveyor belt 2 which extends under crimper wheel 13 to make contact with the protrusions 14 thereof

and with the separate sausages 15 to be formed therebetween. The transverse conveyor belt 2 is guided for this purpose not only along a driving roller 16 but also along two guide rollers 17. Use is further made of a guide strip 18. As a result the conveyor belt 2 is guided closely along the wheel. It is also possible to place conveyor belt 2 a short distance from the wheel. What is essential is that as soon as the separate sausages 15 are released they come to lie on conveyor belt 2 without danger of damage and at the same mutual distance. If conveyor belt 2 were to extend straight they would fall through a relatively great distance, whereby the fragile sausages could be damaged.

A part of transverse conveyor belt 2 further extends substantially horizontally. As elucidated with reference to figure 1, the main transporting device 4 connects onto this part of transverse conveyor belt 2.

In order to switch the sausages 15, use is made of a transfer device 3 which will be described hereinbelow. In the present embodiment the transfer device 3 is suitable for transferring three sausages at a time into the main transporting direction. It will be apparent that, also depending on the length of the sausages, another variable may be suitable for transferring other numbers of sausages. More than one main transporting device can moreover be connected to the transverse conveyor belt depending on the production capacity of the devices leading to or from the transfer machine. The control of the transfer device is herein such that it switches for instance only one of each three or two sausages to the main transporting device.

As shown in figure 2, the actual transfer device 1 comprises a frame 19 to which is fixed a slide element 20. The underside of slide element 20 is provided with an obliquely extending scoop part 21. this scoop part 21 ensures not only a sliding but also a slightly scooping action of the transfer device, which is important so as not to damage the fragile sausages.

In order to prevent that when sausages 15 are placed in the containers or baskets forming part of the main apparatus the sausages 15 bounce out of the relevant containers again as a result of elasticity, a resiliently arranged cover element 22 is arranged on slide element 20.

The frame 19, which is substantially rectangular, is provided on its underside with ears 23 which are each rotatably connected to a lever 24. Both levers 24 are connected to a support frame 26 for rotation on a common shaft 25. For driving thereof the frame 19 is connected by means of two rods 27, only one of which is shown in the drawing, to an element which is driven in rotation, for instance a disc 28 which is drivable by an electric motor 29.

By driving disc 28 in rotation the frame will execute a movement such that slide element 20 performs a movement extending in a vertical plane along a closed route wherein, when electric motor 29 is driven continuously, slide element 20 is in continuous movement, albeit always at a different speed. The movement is such that while passing through a lower part the moving sausages 15 extending in substantially flat position are pushed into the transporting element in substantially horizontal direction, whereafter the slide element moves upward, then moves back over the new sausages meanwhile supplied via conveyor belt 2 and moves downward again on the other side, whereafter this movement is repeated.

It must certainly not be inferred however from the foregoing description that this is a rectangular movement; it is rather a movement of which only the lower part is substantially flat and wherein all other directional components transpose gradually into each other.

The actual main transporting device is shown in more detail in figure 3. The main transporting device is formed essentially by an advancing element in the form of a chain 31 and carriers 32 fixed to chain 31 and guide means which are formed by fixedly arranged guide means 33

in the form of guide rails and guide edges 34 arranged on carriers 32. Instead of a chain 31 it is possible to apply other flexible advancing elements, for instance a spring belt. Chain 31 is provided with openings extending at regular distances into which can be placed pins 35 mounted on carriers 32. It is thus possible by means of the advancing element in the form of chain 31 to advance carriers 32 by means of the pins.

The pins and the holes arranged in the chain are such that the carriers can rotate on an axis extending transversely of the direction of movement. If no further measures are thus taken, the rotation position of the carriers will be determined by the force of gravity. However, the guide means have taken over this function of determining the rotation position of the carrier. The guide means are formed by the fixedly arranged guide rails 33 and recesses 34 arranged on the side surfaces 36 of the carriers. The rotation position of each of the carriers 32 can be determined by causing the recesses to be guided by the guide rails 33.

It will be apparent that carriers 33 are not limited to the embodiment shown here; they make take other forms, in particular they can be provided with other rise edges and the like for determining therewith the position of the carriers. It is further noted that the guide means not only have the function of determining the rotation position of the carriers but also to take over at least a part of the weight of the carriers and the content thereof, so that the advancing element, in this case the chain, is not loaded with this weight. It will be apparent that it is possible to apply other forms of guide means arranged on the carriers, for instance pins or blocks.

Above the chain 31 often a strip has been provided to avoid climbing of the chain or of the carriers, for instance in the case of pollution of the rail 33.

The same effect can besides be obtained by providing a similar rail above the fitting plates 38.

It is finally noted that the transporting device 4 in figure 3 is shown to be arranged in a housing, the walls of which are designated 37.

Figure 4 shows a carrier in its entirety. Carrier 32 comprises two side walls 36 which are manufactured from metal, for instance stainless steel, and which are provided on their outside with fitting pieces 38 which are formed by plates and which are connected by pins 39 to the actual side walls 36. Fitting plates 38 are provided with protrusions, thus forming recesses 34. In the present embodiment two recesses 34 of each side wall extend at an angle of about 90° relative to each other. It is however possible to apply other configurations of recesses, for instance two recesses extending at a different angle or a larger number of recesses.

The pins 35 are further fixed to the actual side walls 36. Both side walls 36 are mutually connected by containers 40 which are bent into a U-shape and which are likewise preferably manufactured from stainless steel. It is otherwise also possible to manufacture these from plastic. Both U-shaped containers 40 are connected by a basket 41 of wire mesh. Wire mesh 41 is preferably formed, as shown in the drawing, by woven wire mesh. It is otherwise possible to make use of punched wire mesh. The wire mesh is preferably manufactured from material which does not have a very high thermal conduction. Thus is prevented that when it remains for a long period in a space with a high temperature the wire mesh takes on this temperature and causes burning phenomena in the product situated in the basket. The basket shape has the further advantage that the product is easily accessible from all sides for radiation acting on the product or gases exerting an effect on the product.

As already stated in the preamble, this effect is improved by occasional tilting of the basket as a result of the action of the guide means.

Further, reference is made to figure 5. Shown in figure 5 is the construction of the third processing housing 7. It can be seen herein that the third processing housing 7 is connected by means of a tunnel 42 to the second processing housing 6 shown in figure 1 but not in figure 5.

The first main transporting device 4 is guided via a first transfer device 43 which is connected to the second transporting device 8. The transfer device provides transfer of the content of the baskets of main transporting device 4 to the baskets of auxiliary transporting device 8. The transporting devices are otherwise both of substantially the same construction, wherein it is pointed out that the auxiliary transporting device, because of the fact that it is exposed to a more aggressive environment, is possibly manufactured from materials which better withstand this environment.

The main transporting device is subsequently guided along a second transfer device 44 which is adapted to transfer the content of the relevant carriers from the auxiliary transporting device to the main transporting device.

The auxiliary transporting device 8 leads through a chamber 45 and is adapted to spray the content of the carriers with smoke liquid. A spray device 46 is arranged for this purpose. It is equally possible for this purpose to make use of immersing devices or vapour supply devices.

In order to reach chamber 45 the auxiliary transporting device 8 moves through a tunnel 47, the width of which is slightly greater than the width of the carriers and the length of which as measured in the direction of the transporting device is greater than the distance between the carriers. Discharge of the carriers

out of chamber 45 by the transporting device also takes place with a similar, sluice-like construction 48.

As stated, the first transfer device 43 comprises a guide wheel 49 for guiding each of the carriers. This guide wheel here fulfils the function of the fixedly arranged guide means. Due to the placing of the guide wheels 50 and 51 for guiding the chain of the auxiliary transporting device, the carriers or baskets forming part of the auxiliary transporting device are pressed against the carriers of the main transporting device, wherein by changing the angle of the combination the product present in the carriers of the main transporting device is transferred to the other container.

A similar, though reverse movement takes place at the second transfer device 44. The actual guide wheel 52 is herein placed close to the auxiliary transporting device.

It is thus possible to apply a separate auxiliary transporting device which is not exposed to the aggressive environment in chamber 45. It is of course possible to eliminate the effectiveness of this chamber by moving to the left the assembly of the auxiliary transporting device in accordance with an embodiment not shown in the drawing. This auxiliary transporting device is replaced by a guide plate in order to prevent the products falling out of the carriers of the main transporting device.

Figure 6 shows a variation of the smoke apparatus depicted in figure 5. Herein use is made of a plunging apparatus 55 beside of a spraying apparatus 46. To avoid making the auxiliary transporting device unnecessary long, both transfer devices are located at about the same level.

As a consequence thereof, they are differently constructed than the transfer devices in the preceding embodiment. In the first transfer device 43 the carriers 32 of the main transport apparatus come only in co-

operation with the carriers of the auxiliary transport apparatus 8, when they have been tilted over an angle of 180°. To avoid that the contents of the carriers drop during the tilting a guide plate 56 has been provided. At the end of the guide plate the contents of the carriers drop into the carriers of the auxiliary transport device 8. Subsequently, the contents are sprayed with smoke liquid by the spraying apparatus 46 and the contents are thereafter plunged in the smoke liquid. The apparatus comprises a number of blowers 57 blowing off extra adhering smoke liquid from the products.

In the second transfer apparatus 54 the contents of the carriers of the auxiliary transport apparatus is fed back to the carriers of the main transport apparatus 4. It is noted that to maintain a synchronous movement between both transport apparatuses, the speed of the auxiliary transport apparatus should be smaller than that of the main transport apparatus with respect to the smaller radius.

Further, it is noted that the shape of the path of the auxiliary transport apparatus is such, that it is also possible to connect the carriers rigidly with the chain of the auxiliary transport apparatus.

In figure 7 a positioning apparatus has been depicted, which is used for arranging the products to be processed, like sausages on a defined position in the carriers. For a number of processes to be executed to the products it is of importance that the process is used for the correct part of the product, like the bending of a sausage to horse-shoe shape.

The positioning apparatus can be located between the processing housings 6,9 in the configuration depicted in figure 1, which housings serve as a drying housing, respectively a steam cook housing, and the latter is preferably integrated in the smoking apparatus arranged between those housings which is described with the help of the figures 5 and 6. It is the most simple, when the position apparatus acts on a substantially

horizontal part of the transport apparatus. The positioning apparatus comprises essentially a frame 58, extending like a bridge over the transport apparatus 4. In the frame 58 a carrier 59 has been provided which is adjustable in height along the frame. Four U-shaped holders 60 have been provided to the carrier 59, within which a shaft 61 is journalled rotatably. Within each of the holders 60 a hub 62 has been provided which comprises at its circumference a number radially extending brackets 63.

The shaft 61 is driven in rotation, so that the brackets 63 move along with the carriers. They have such a length, that they extend over a part of the path of the carriers until into the carriers. During this part of the path the brackets execute a movement towards the center of the carriers by means of a curve control from the outer side of the carriers, which is illustrated in three subsequent stages depicted from under to above in figure 7. During this movement, the subsequent products are shifted to the middle.

The center is a defined position aimed at.

In figure 8 a bending apparatus for the bending of products, in particular of sausages, is depicted. Such a bending device is for instance arranged between the positioning apparatus depicted in figure 7 and the subsequent drying device. It is of importance that the sausages are in an easy bendable condition, in particular the skin of the sausages.

Generally, the bending device comprises a drum 66, unto which a number of bending units 67 has been arranged. It is, however, also possible to locate the bending units on another kind of carrier. By means of a transfer device not depicted in the drawings the sausages or other products are supplied to the bending units 67 located on the drum 66.

Each bending unit comprises two engaging elements 68, which have been arranged on the drum by means of a crank-driving shaft mechanism. By locating the

sausages in gripping elements extending in each others prolongation, and by making subsequently both engaging elements rotate, the bending action is executed.

Herein the driving of the movable engaging element is dependent on the position of the drum 66.

Of course the sausages to be bended are supplied to the substantially horizontal part of the drum 66. During the further rotation of the drum 66 it is avoided that the sausages drop too early from the bending units by means of a guide, which is located at the outer side of and concentric with the drum, and which preferably moves along with the drum.

Below the drum the sausages are taken over by a next transporter. Herein the drum has been dimensioned such, that the sausages have been bent to the correct shape.

During rotation of the drum the subsequent bending units 67 move subsequently and not repeatingly in the direction of one end of the drum and in the direction of the other end of the drum, such that the sausages are located compactly in six rows on the next transporter, which can be provided of standing up rims extending in the direction of transport. By such a compact transport efficient after-drying can be obtained.

Further, the drum comprises a transport unit 71 for each drum, which is used, when straight sausages should be produced. Herein the bending units are not acting. The choice between the bending units or the transport units is determined by the synchronisation between the transport apparatus and the rotation of the drum; by rotating the drum over a distance between the bending unit and the transport unit, it is possible to make a choice.

In figure 9 an alignment apparatus for the carriers has been depicted, which has been generally designated with 77. This alignment apparatus serves to bring the carriers 32 in a defined rotation position. The alignment apparatus can be inserted in the apparatus

depicted in figure 1 in any required position. The alignment apparatus comprises a lower guide rail 72, in which an indent 73 has been provided. At the upper side the alignment apparatus comprises a weight 75 connected rotatably to a shaft 74. Both the weight 75 as the lower guide rail 72 are located close to the guide rails 34 connected to the carriers 32. In the normal situation, that is to say, when the carriers 32 are in the position as depicted in figure 9, the transport of the chain 31 moves the relevant carrier and the guide rim 34 over the indent 73. By the force extended by the weight the carrier tilts backwardly in a slight amount, so that there is no risk that the front edge of the guide rim 34 engages the indent 73 leading to an unadvertent tilting of the carrier. When, however, one of the carriers is transported in a front-to-back position, the weight 75 will press the sharp edge of the guide rim 34 until the indent 73, so that this guide rim 34 is stopped at its lower side, and will execute a rotation until the carrier is in its correct position.

It is, however, also possible that a carrier is supplied in a complete upsidedown position. For such a situation a guiding 76 has been provided engaging the side wall 36 of the carriers, which are supplied in the fully turned upsidedown position. In the present embodiment the side wall 36 has the contour of the carrier. The guiding has been provided in the path of the plate, in which the guiding exerts such a force to this counter plate, that the carrier tilts and comes in the correct or in the upsidedown position. When the carrier arives in the upsidedown position, it will turn again at the indent 73.

It will be apparent that the scope of protection of the present invention is limited only by the claims and not by the embodiment shown above.

CLAIMS

1. Transporting device for transporting food products to be subjected to a processing, comprising at least one advancing element for advancing carriers for the food products for processing fixed to the advancing element along a route extending through a processing space, **characterized by** guide means for guiding the carriers along at least a part of the route.

2. Transporting device as claimed in claim 1, **characterized in that** the advancing element is endless and the route is closed.

3. Transporting device as claimed in claim 1, **characterized in that** the route is linear and the advancing element is adapted to transport the carriers alternatingly in opposing directions.

4. Transporting device as claimed in claim 1, 2 or 3, **characterized in that** the guide means are adapted to take the weight of the carriers.

5. Transporting device as claimed in claim 1, 2, 3 or 4, **characterized in that** the transporting device comprises secondary guide means for only guiding the advancing element.

6. Transporting device as claimed in any of the foregoing claims, **characterized in that** the carriers are mounted rotatably on the advancing element.

7. Transporting device as claimed in claim 6, **characterized in that** the guide means are adapted to determine the rotation position of each of the carriers subject to the position of the carrier.

8. Transporting device as claimed in claim 6 or 7, **characterized in that** the transporting device comprises a correction unit for making the carriers move towards a defined position of the carriers.

9. Transporting device as claimed in any of the foregoing claims, **characterized in that** the route extends through at least a second processing space, the first and

second processing spaces are connected by a tunnel, the length of which is at least as great as the maximum distance between the carriers in the direction of movement, and that the dimension of the tunnel in a direction transversely of the direction of movement is less than 1.5 times the dimension of the carriers, including a product possibly protruding from the carriers, in this direction.

10. Transporting device as claimed in any of the foregoing claims, **characterized in that** the advancing element comprises at least one spring belt.

11. Transporting device as claimed in any of the claims 5-9, **characterized in that** the advancing means comprise at least one chain provided with hollow links and that each of the carriers is provided with a protruding part extending into a hollow link.

12. Transporting device as claimed in any of the foregoing claims, **characterized in that** the carriers each comprise wire mesh on their sides extending transversely of the direction of movement.

13. Transporting device as claimed in claim 12, **characterized in that** the sides of the carriers extending parallel to the direction of movement comprise at least substantially closed walls.

14. Transporting device as claimed in any of the foregoing claims, **characterized in that** the carriers are provided with guide elements for guiding of the carrier into a determined position by guide supports forming part of the guide means.

15. Transporting device as claimed in claim 14, **characterized in that** the guide supports are displaceable for changing the position of the carriers.

16. Carrier for use in a transporting device as claimed in any of the foregoing claims.

17. Carrier as claimed in claim 14, comprising wire mesh arranged on its sides extending transversely of the direction of movement for supporting the food

products, **characterized in that** the carriers are provided with guide elements.

18. Carrier as claimed in claim 17, **characterized in that** the guide elements are arranged on the outside of the carrier.

19. Carrier as claimed in claim 17 or 18, **characterized in that** the wire mesh is manufactured with a passage ratio greater than 65%.

20. Carrier for food products, for instance as claimed in claims 17-19, comprising wire mesh for supporting food products, **characterized in that** the wire mesh is woven.

21. Carrier as claimed in any of the claims 17-20, **characterized in that** the wire mesh is manufactured from a material with a thermal conduction coefficient of a maximum of 0.25 $W K^{-1} m^{-1}$.

22. Carrier as claimed in any of the claims 17-21, **characterized in that** the wire mesh is plastic mesh, for instance mesh of polyester.

23. Carrier as claimed in any of the claims 17-22, **characterized in that** the wire mesh is received in containers on its edges extending transversely of the direction of movement.

24. Carrier as claimed in claim 23, **characterized in that** the containers are releasably connected to the guide elements.

25. Carrier as claimed in any of the claims 17-24, **characterized in that** the guide elements are manufactured from plastic.

26. Guide element for use with a carrier as claimed in claim 24.

27. Composite transporting apparatus comprising at least two transporting devices for transporting food products for processing, for instance as claimed in any of the claims 1-16, **characterized in that** both transporting devices are coupled by a collective transfer device.

28. Composite transporting apparatus as claimed in claim 27, comprising at least two transporting devices

as claimed in any of the claims 1-16, **characterized in that** the transfer device is formed by a route of both transporting devices which extends partly parallel, the guide means in the parallel trajectories are adapted to determine the position of the carriers so that the content of the carrier of the first transporting device is moved to a carrier of the second transporting device.

29. Composite transporting apparatus as claimed in claim 28, **characterized in that** the route of both transporting devices extends such that the content of the carrier of the first transporting device is moved to the second transporting device.

30. Composite transporting apparatus as claimed in claim 28 or 29, **characterized in that** the parallel trajectories extend in an arc.

31. Composite transporting apparatus as claimed in claim 27-30, **characterized by** a first transfer device for transferring the food products from the first transporting device to the second transporting device, and a second transfer device for transferring the food products from the second transporting device to the first transporting device.

32. Loading device for loading a food product fed by supply means to the loading device into a carrier of a transporting device, for instance a carrier forming part of a transporting device as claimed in claims 1-16 or a carrier as claimed in claims 17-25, comprising transfer means for displacing the food product from the supply means into the carrier, **characterized in that** the transfer means comprise a slide element drivable by drive means along a closed route and the route comprises a part wherein a food product fed by the supply means is displaced by the slide element into the carrier.

33. Loading device as claimed in claim 32, **characterized in that** the slide element follows a path located in a vertical plane as it follows the route.

34. Loading device as claimed in claim 32 or 33, **characterized in that** the route comprises a

substantially horizontal part wherein the slide element shifts the food product.

35. Loading device as claimed in claim 34, **characterized in that** the slide element is provided with a scoop element on its bottom edge.

36. Loading device as claimed in claim 34 or 35, **characterized in that** the slide element is initially accelerated and subsequently slowed during the substantially horizontal part of the route.

37. Loading device as claimed in any of the claims 32-36, **characterized in that** the slide element is connected to the drive means by means of a connection such that during a part of the route the slide element substantially covers the container of the transporting device.

38. Loading device as claimed in claim 37, **characterized in that**, the slide element has a relative low speed or stands motionless during said part of the route.

39. Loading device as claimed in any of the claims 32-37, **characterized in that** the drive means comprise a rod assembly with a crank drivable in rotation.

40. Loading device as claimed in any of the claims 32-39, **characterized in that** the supply means comprise a conveyor belt extending transversely of the transporting direction of the transporting device.

41. Production device for producing food products, comprising a production member with an at least partially curved configuration and transporting means which are formed for instance by supply means, as stated in any of the claims 32-40 and which connect onto the production member, **characterized in that** the transporting means are at least partially curved together with the production member.

42. Production device as claimed in claim 41, **characterized in that** the production member is formed by a crimper wheel of a sausage manufacturing apparatus.

43. Sausage manufacturing apparatus comprising a transporting device as claimed in any of the claims 1-15, **characterized in that** the processing device is formed by a drying device.

44. Sausage manufacturing apparatus as claimed in claim 43, **characterized in that** the transporting device is a composite transporting apparatus as claimed in any of the claims 27-31 and that the first processing device is formed by a drying device.

45. Sausage manufacturing apparatus as claimed in claim 44, **characterized in that** the second processing device is formed by a smoking device.

46. Sausage manufacturing apparatus according to claim 43, **characterized** by a bending device for bending the sausages.

47. Sausage manufacturing apparatus according to claim 44, **characterized in that** the bending device is adapted for selectively bending or not bending a passing sausage.

48. Sausage manufacturing apparatus according to claim 46 or 47, **characterized in that** the sausage bending device is preceded by a positioning device for positioning the sausages.

49. Sausage manufacturing apparatus according to claim 48, **characterized in that** the positioning apparatus is adapted for positioning the sausages in a floating condition.

50. Processing apparatus for subjection products, for instance food products to processing by a fluid, the apparatus comprising:

- carriers movable along a path;
- a housing through which the path extends itself;
- flowing means for making the fluid flowing by a path, **characterized in that** the path of the carriers extend in a zigzag manner, and that the subpaths of the zigzag movement extend substantially horizontally.

51. Processing apparatus according to claim 50, **characterized in that** the flowing means are adapted to make the fluid flow in a substantial vertical direction through the housing.

52. Processing apparatus according to claim 50 or 51, **characterized in that** the path of the carriers has a upward zigzag part and a downward zigzag part.

53. Processing apparatus according to claim 52, **characterized in that** in the housings different processing conditions prevail.

54. Processing apparatus according to claim 53, **characterized in that** between the housings separating means have been provided.

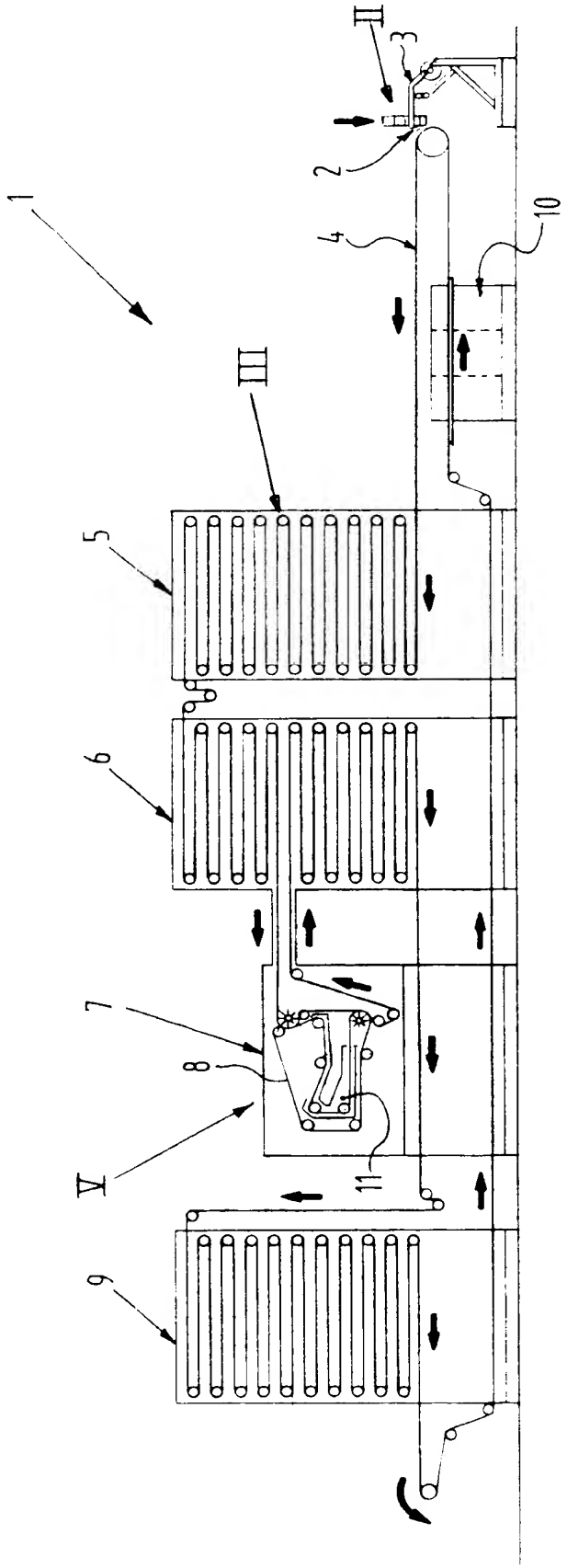
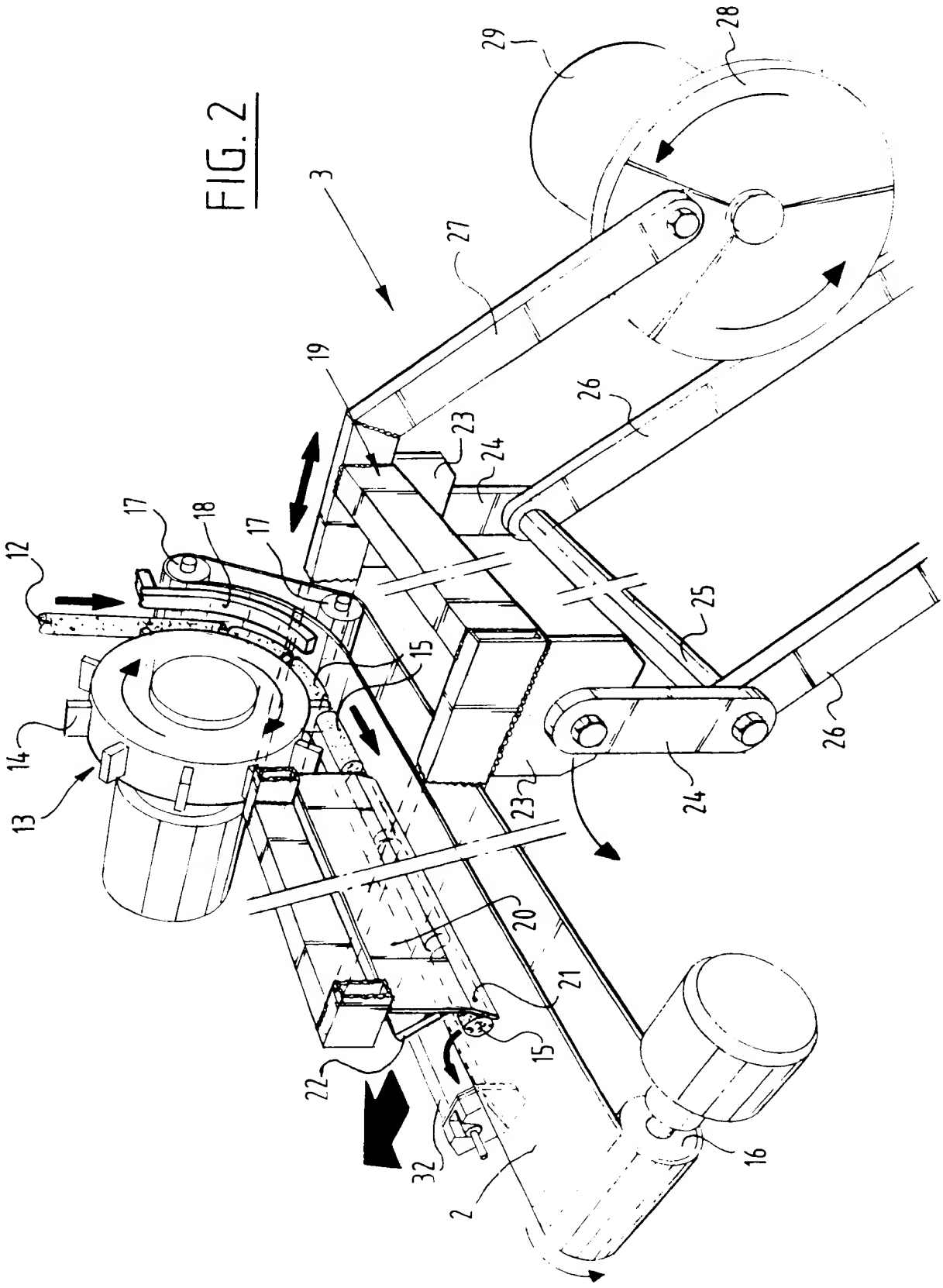


FIG. 1

FIG. 2



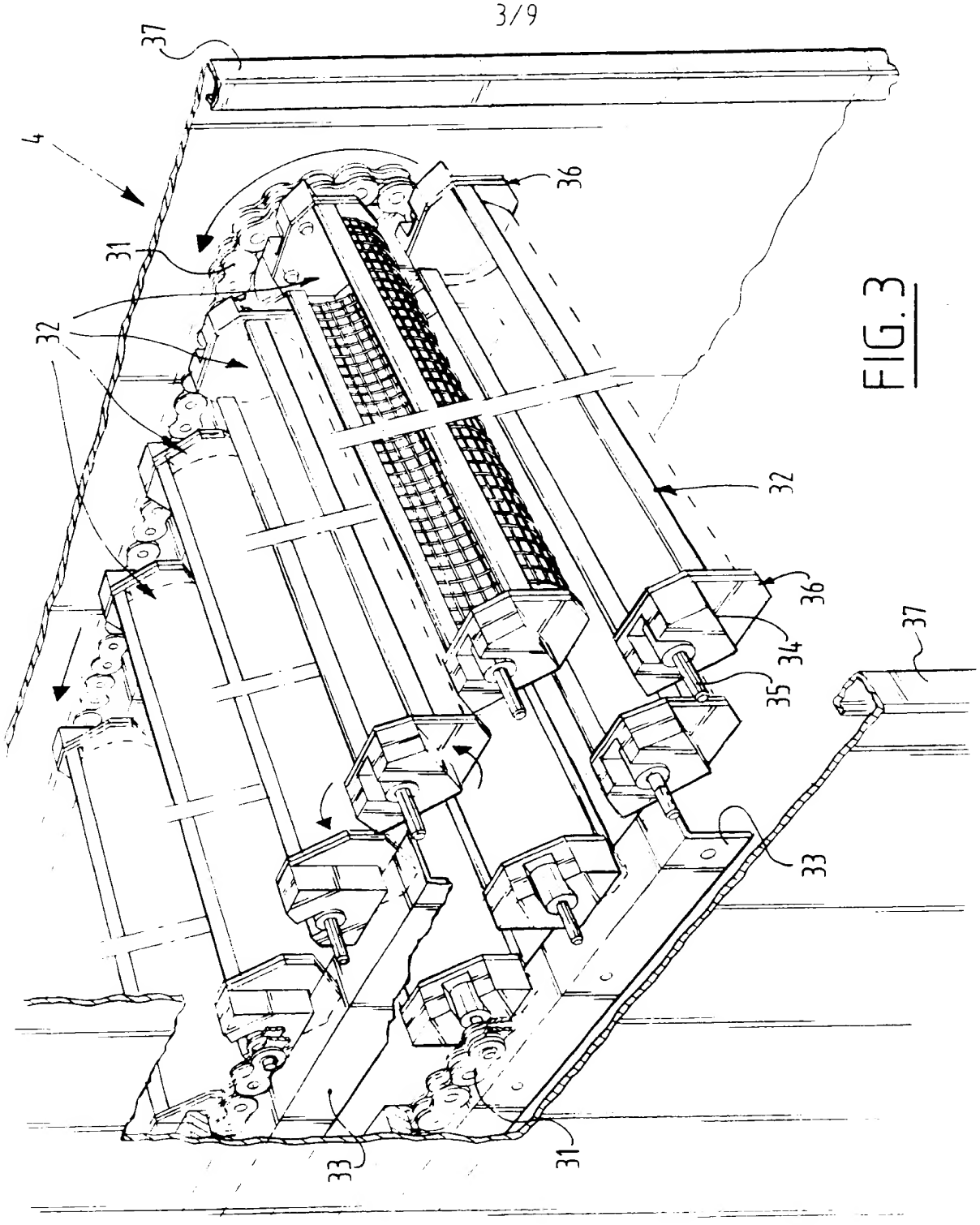


FIG. 3

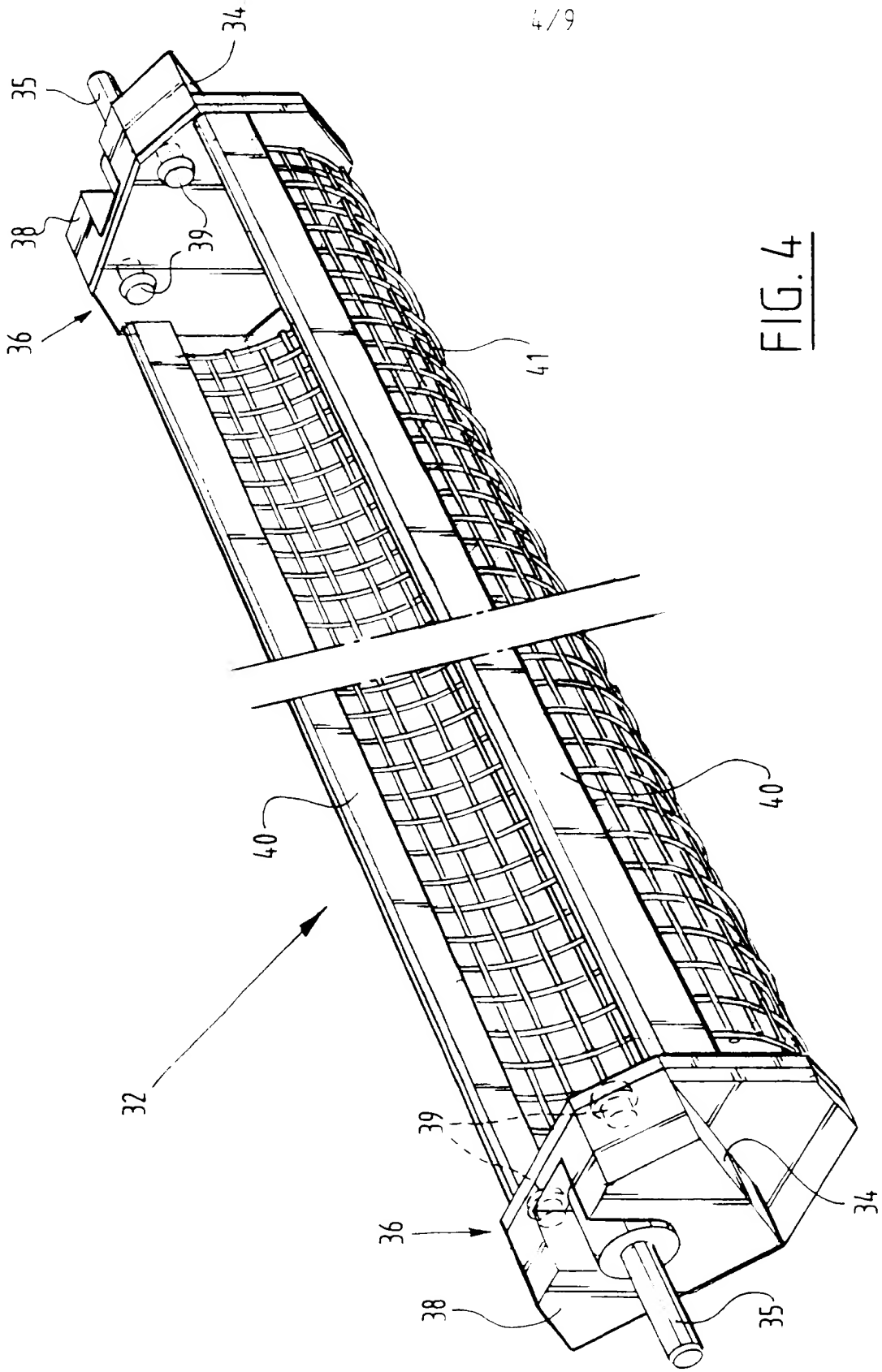


FIG. 4

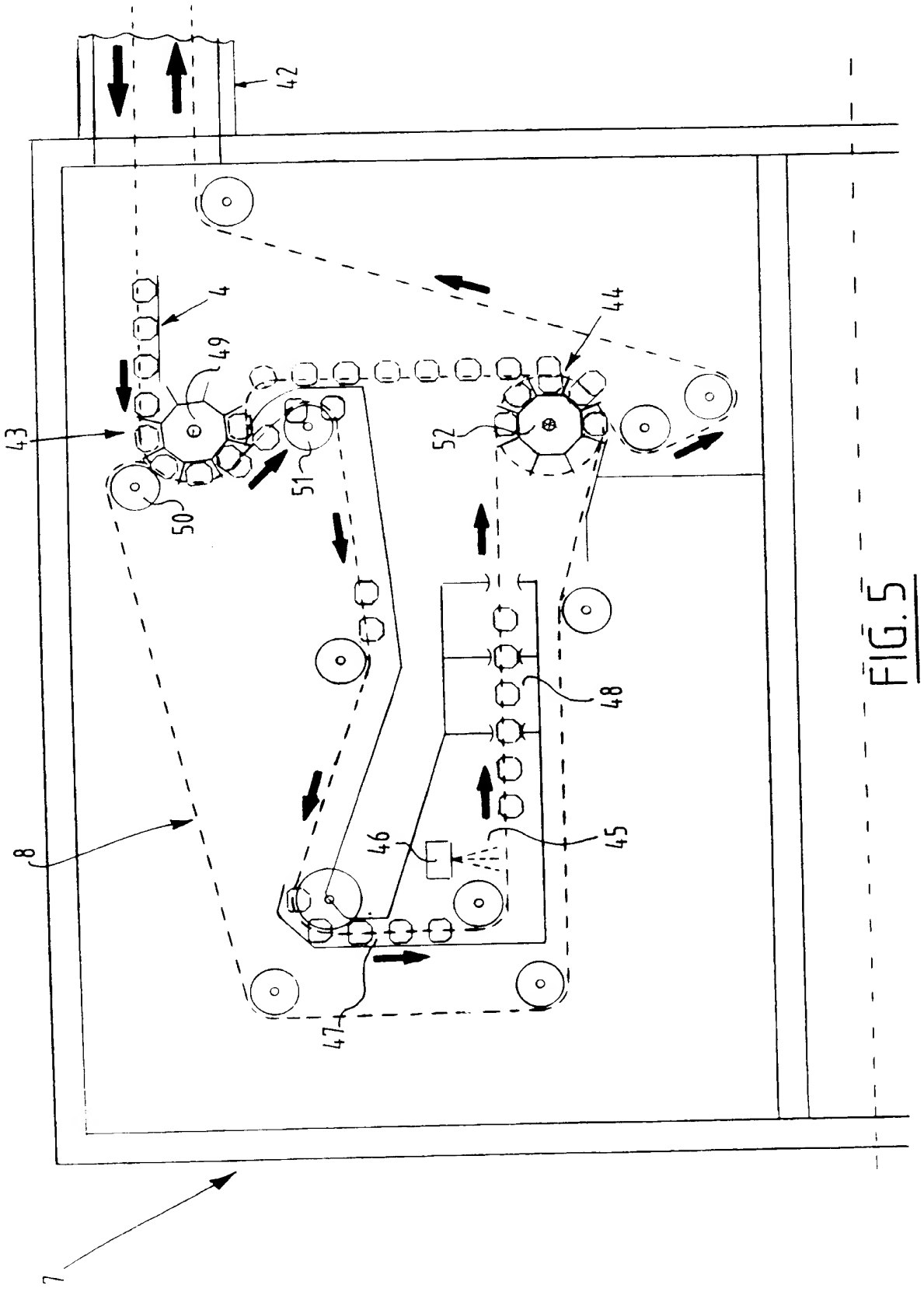


FIG. 5

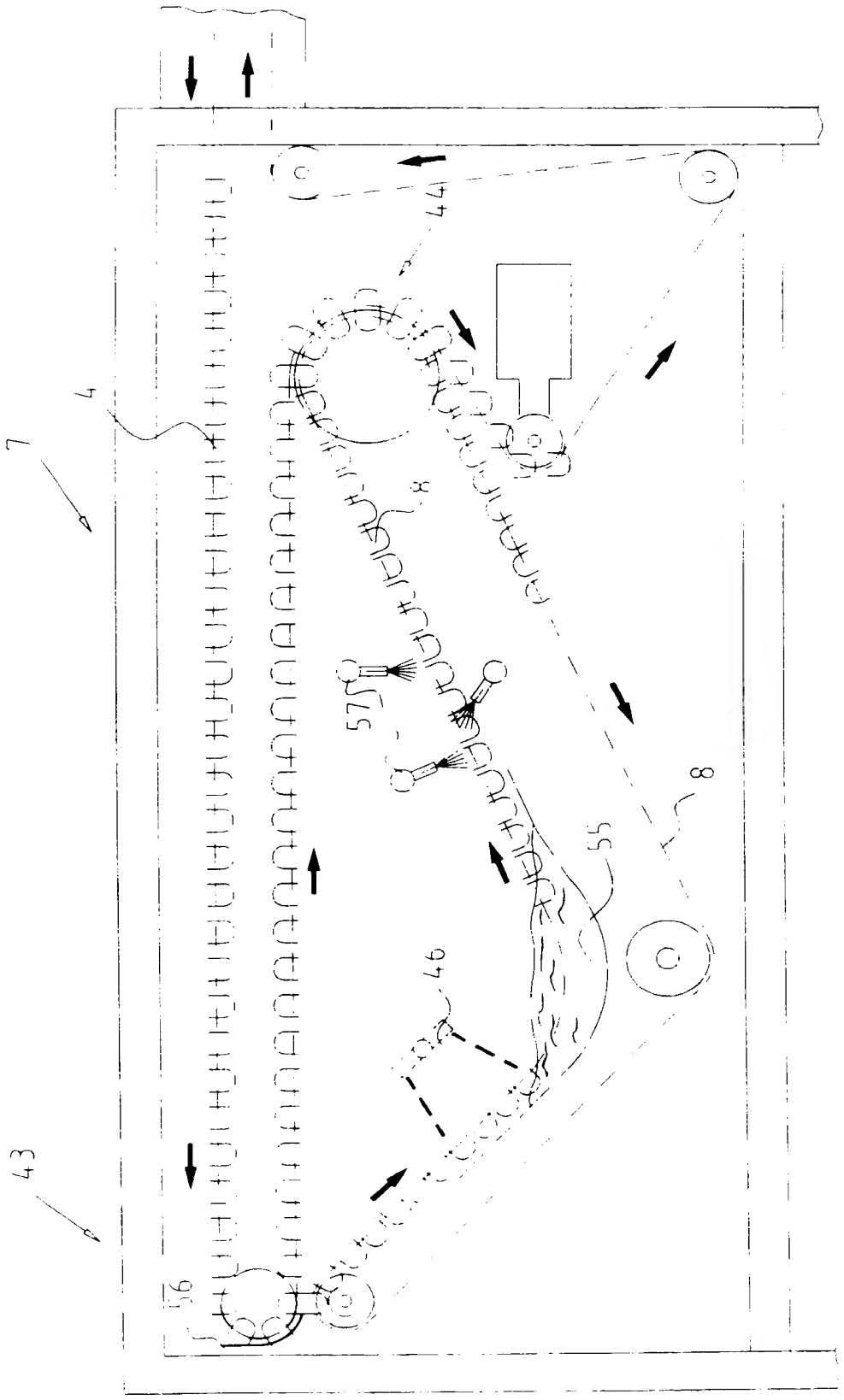


FIG. 6

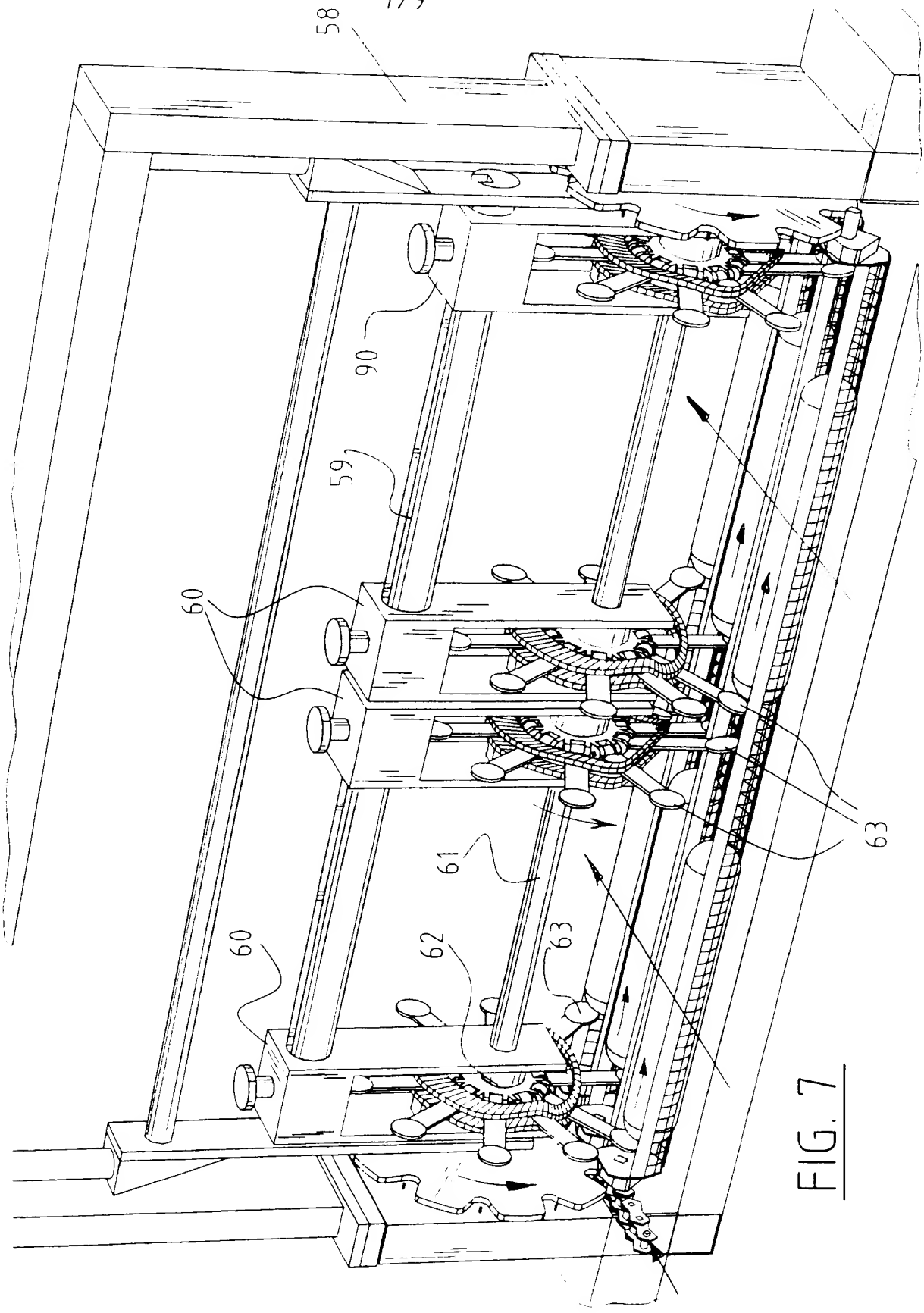
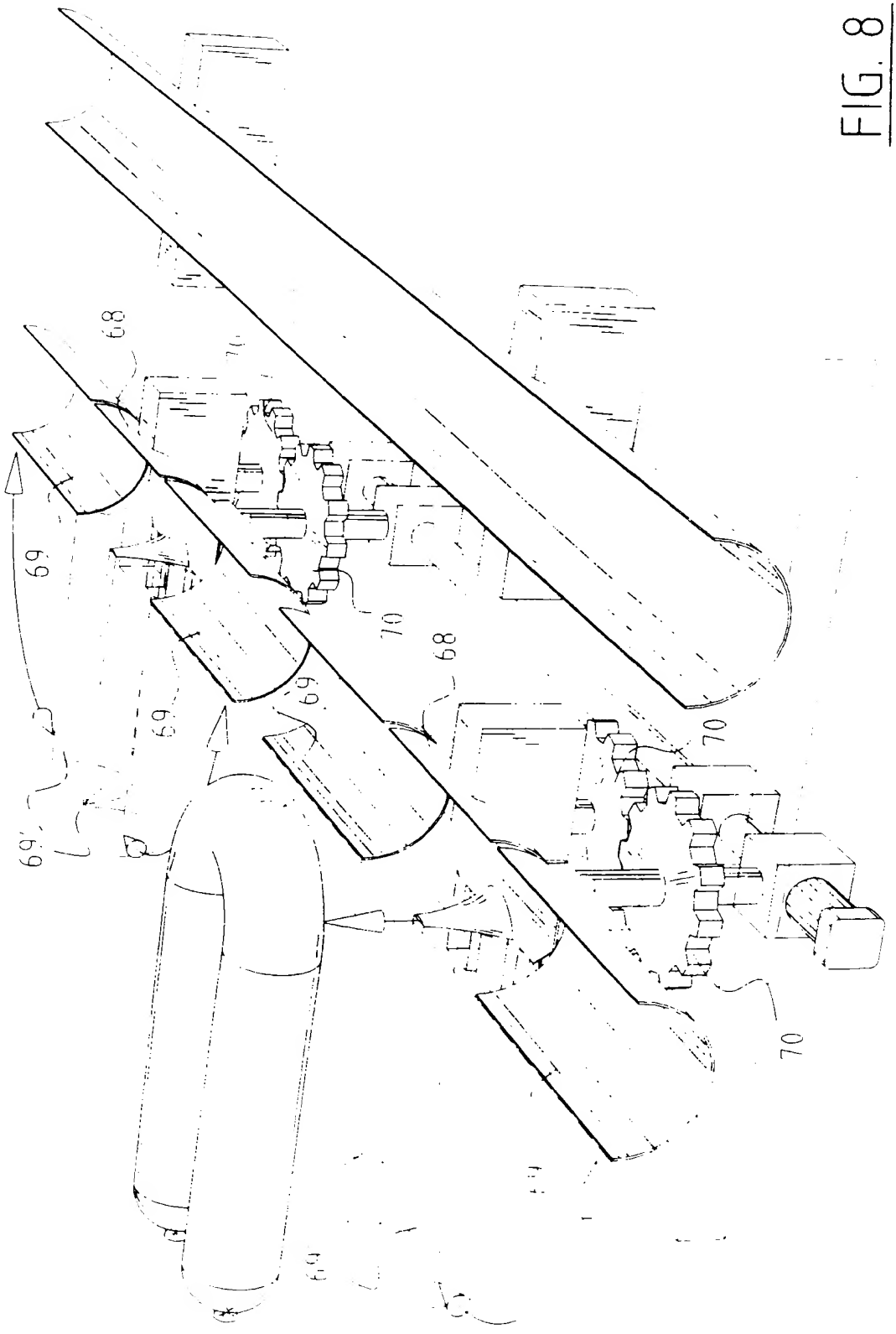


FIG. 7

FIG. 8



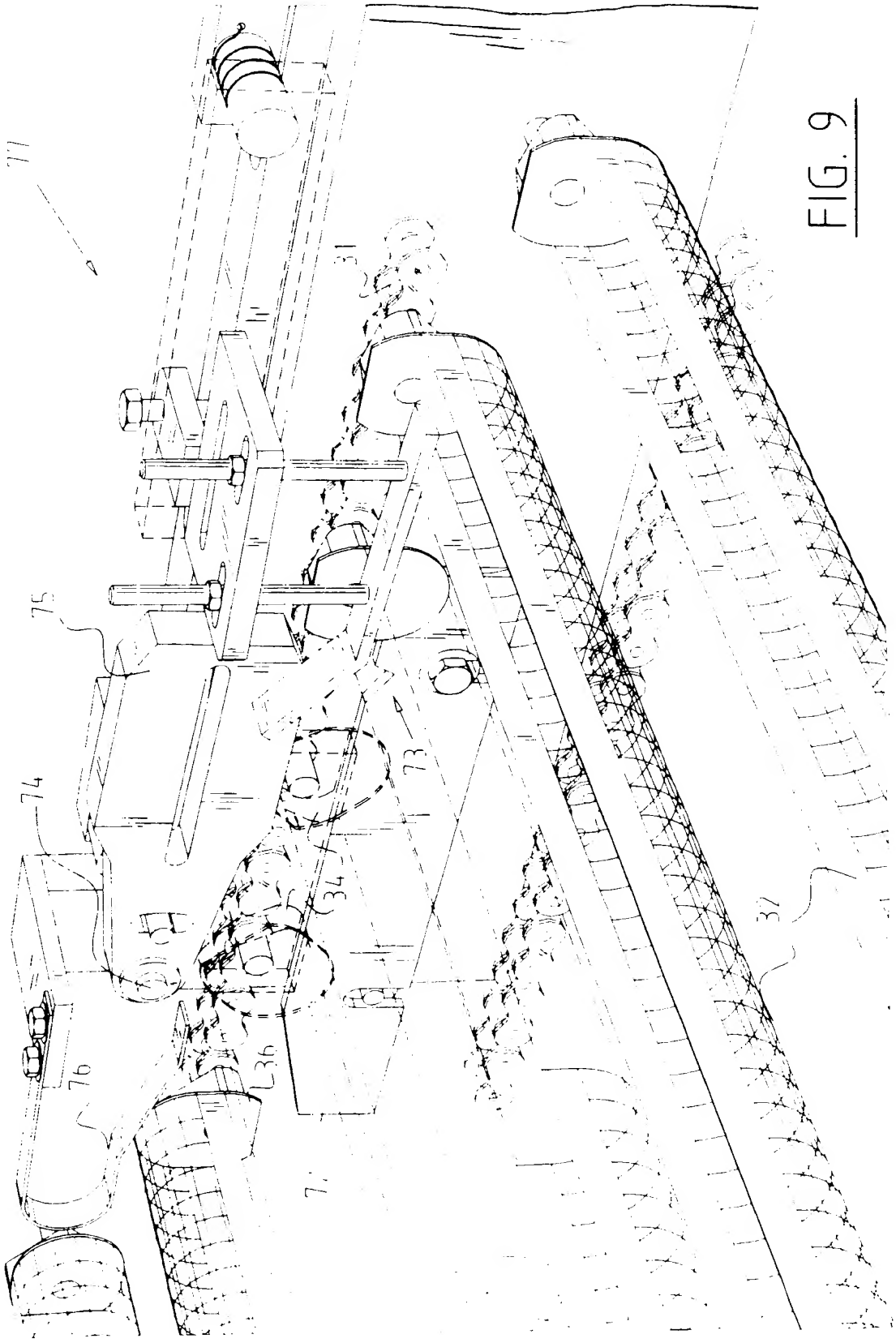


FIG. 9

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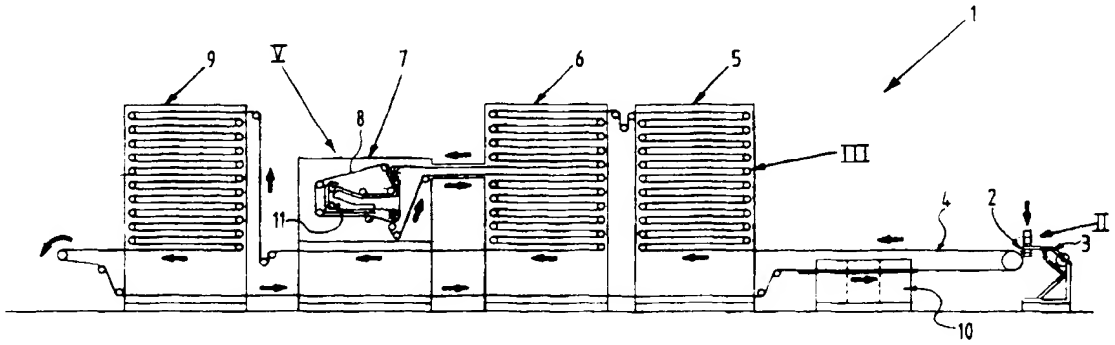

(57) Abstract

The invention relates to a transporting device for transporting food products to be subjected to a processing, comprising at least one advancing element for advancing carriers for the food products for processing fixed to the advancing element along a route extending through a processing space, and guide means for guiding the carriers along at least a part of the route. The invention also relates to a carrier comprising wire mesh arranged on its sides extending transversely of the direction of movement, wherein the carriers are provided with guide elements for use in such a transporting device. The invention further relates to a composite transporting apparatus comprising at least two transporting devices for transporting food products for processing, wherein both transporting devices are coupled by a collective transfer device.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 98/00531

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A22C11/00 A23L1/317

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A22C A23L A23B A01J B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	DE 10 23 308 B (MULTHAUF) 23 January 1958 (1958-01-23) column 3, line 33 - line 65 ---	1,2,6,7, 10,11, 14-16,43
A	DE 893 436 C (NEUMAN) 26 October 1953 (1953-10-26) page 2, line 56 - line 110; figures 1,2 ---	1-3, 9-11, 43-45
A	"PRODUCING FRANKFURTERS CONTINUOUSLY" PRODUCTION ENGINEERING., no. 10, November 1963 (1963-11), pages 66-67, XP002067126 CLEVELAND US page 67, right-hand column, last paragraph; figure 3 ---	1,11-13, 17,19, 20,43

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search
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INTERNATIONAL SEARCH REPORT

International Application No
PCT NL 98/00531

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NL 8 900 871 A (MEYN MASCHF) 1 November 1990 (1990-11-01) page 5, line 14 - page 7, line 31	27 28,29,31
A	US 3 624 774 A (MARIETTA JAMES W JR) 30 November 1971 (1971-11-30) column 7, line 12 - column 8, line 65	32
A	GB 2 298 404 A (STIMPFL & GIESELER GMBH) 4 September 1996 (1996-09-04) page 10, paragraph 4 - page 16, paragraph 1	32,40
A	FR 1 410 053 A (ULLRICH) 10 December 1965 (1965-12-10) the whole document	41,42
P,X	WO 98 16115 A (TOWNSEND ENGINEERING CO) 23 April 1998 (1998-04-23) page 4, line 9 - page 5, line 37	50-52
X	US 3 152 358 A (MILLENAAR) 13 October 1964 (1964-10-13) column 3, line 16 - line 55; figure 1	50,52-54
A	US 3 494 277 A (OLSON ROY N ET AL) 10 February 1970 (1970-02-10) column 3, line 50 - line 68; figure 1	50-54
A	NL 8 901 469 A (STAAL EN MACHINEBOUW ABERSON B) 2 January 1991 (1991-01-02)	
A	NL 265 896 A (EMHART) 10 July 1964 (1964-07-10)	
A	EP 0 196 373 A (ROLCO INT BV) 8 October 1986 (1986-10-08)	
A	FR 2 618 132 A (GUILMOTO SARL) 20 January 1989 (1989-01-20)	
A	NL 9 201 307 A (MEYN MASCHF) 16 February 1994 (1994-02-16)	
A	US 5 103 718 A (SCHREIBER JAMES D ET AL) 14 April 1992 (1992-04-14)	

2

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL 98/00531

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons

1 ☐ Claims Nos
because they relate to subject matter not required to be searched by this Authority, namely.

2. ☐ Claims Nos.
because they relate to parts of the international Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically.

3 ☐ Claims Nos..
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6 4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1 ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3 ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.

4 ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest

☒ No protest accompanied the payment of additional search fees

INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 98/00531

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-26 +43-49

   Transporting device for food products to be subjected to a processing with appropriate carriers and guide means

2. Claims: 27-31

   (Considering the wording "for instance" claim 27 is independant)
   Composite transporting apparatus.

3. Claims: 32-42

   (Considering the wording "for instance" claim 32 is independant)
   Loading device with transfer means.

4. Claims: 50-54

   Processing apparatus to processing food products by fluid

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/NL 98/00531

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE 1023308	B		NONE		
DE 893436	C		NONE		
NL 8900871	A	01-11-1990	NONE		
US 3624774	A	30-11-1971	NONE		
GB 2298404	A	04-09-1996	DE	19507443 A	05-09-1996
			CZ	9600630 A	16-10-1996
FR 1410053	A	10-12-1965	NONE		
WO 9816115	A	23-04-1998	US	5843504 A	01-12-1998
			AU	4904697 A	11-05-1998
			EP	0932340 A	04-08-1999
US 3152358	A	13-10-1964	NONE		
US 3494277	A	10-02-1970	NONE		
NL 8901469	A	02-01-1991	NONE		
NL 265896	A		NONE		
EP 0196373	A	08-10-1986	NL	8501012 A	03-11-1986
			JP	61229710 A	14-10-1986
FR 2618132	A	20-01-1989	NONE		
NL 9201307	A	16-02-1994	NONE		
US 5103718	A	14-04-1992	US	5398598 A	21-03-1995
			US	5244683 A	14-09-1993

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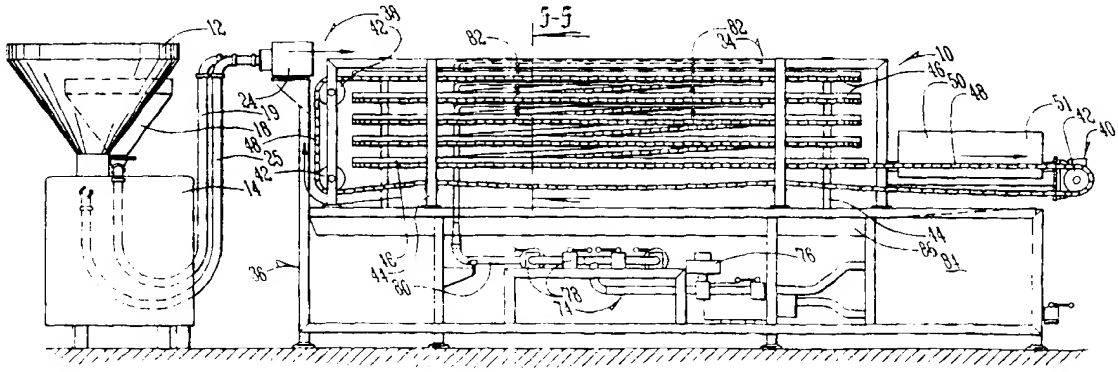
(54) Title: METHOD AND MEANS FOR COAGULATING THE OUTER SURFACE OF A SAUSAGE STRAND DISCHARGED FROM A SAUSAGE EXTRUDING MACHINE



(57) Abstract

The sausage strand (26) is extruded onto a belt (48) and carried through a brine shower system for about 40 seconds. The brine is sprayed through nozzles (82) onto the sausage while traveling on the belt (48). The sausage is turned several times during the shower to insure even brine distribution. The conveyor speed is controlled to match the speed of the extruder (24) thereby preventing stretching of the product as it is being extruded. The conveyor (34) provides exact motion control of the sausage rope and the dwell time in the brine shower can be exactly regulated. Since the conveyor system is open it lends itself to easy cleaning and visual inspection. The conveyor (34) consists of a frame (36) which supports the conveyor system, the brine shower system, air knives and the infrared heater (50). The brine shower system is composed of a drip pan, a brine tank (84), a centrifugal pump and a plumbing/brine distribution network. The centrifugal pump conveys the brine from the tank (84) through the brine distribution network. The brine is sprayed onto the sausage through nozzles (82) located at many intervals throughout the whole conveyor (34) section.

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TITLE: METHOD AND MEANS FOR COAGULATING THE OUTER SURFACE OF A SAUSAGE STRAND DISCHARGED FROM A SAUSAGE EXTRUDING MACHINE

BACKGROUND OF THE INVENTION

In recent times, it has become known to coextrude a strand of sausage material which has an inner core of meat emulsion having an outer surface material that can be coagulated to provide an encasement for the strand. The coagulation normally includes subjecting the extruded strand to a brine solution. The brine is applied immediately after the strand is extruded.

In the past this was done by extruding the sausage into a brine bath and letting the sausage float, on top of the brine, into a helical pipe. The dwell time of the sausage in the brine was determined by the length of the helical piping, the downward angle and the speed of the brine flow. Several disadvantages were discovered using this method. It was found that different sausage diameters went through the helix with different speeds. Because the extrusion speed stayed equal, exact diameter control was lost due to stretching. This would give very poor weight control when linking the strand into individual sausages. In addition, the exact dwell time in the brine was not achieved and would cause differences in uniformity of the casing. Further, it was found that often the sausage strand would tighten around the center of the helix and become jammed. This would always cause a production interruption and lengthy delays. Cleaning the inside of the pipe presented problems because inspection requires that one can visually check for cleanliness and this was not possible.

It is therefore a principal object of this invention to provide a method and means for coagulating the outer surface of a sausage strand discharged from a sausage extruding machine wherein the sausage strand will not be stretched as it moves either from the extruder to the conveyor, or while it is on the conveyor.

A further object of this invention is to provide a method and means for coagulating the outer surface of a sausage strand discharged from a sausage extruding machine which will spray brine on the sausage strand at a plurality of positions along the length thereof.

A still further object of this invention is to provide a method and means for coagulating the outer surface of a sausage strand discharged from a sausage extruding machine which is easily cleaned and visually accessible during operations.

A still further object of this invention is to provide a method and means for coagulating the outer surface of a sausage strand discharged from a sausage extruding machine when the sausage strand is cured at least in part by an infrared heat source.

These and other objects will be apparent to those skilled in the art.

SUMMARY OF THE INVENTION

The sausage strand is extruded onto a belt and carried through a brine shower system for about 40 seconds. The brine is sprayed through nozzles onto the sausage while traveling on the belt. The sausage is turned several times during the shower to insure even brine distribution.

The conveyor speed is controlled to match the speed of the extruder thereby preventing stretching of the product as it is being extruded. The conveyor provides exact motion control of the sausage rope and the dwell time in the brine shower can be exactly regulated. Since the conveyor system is open it lends itself to easy cleaning and visual inspection. The conveyor consists of a frame which supports the conveyor system, the brine shower system, air knives and the infrared heater.

The belt is a Multi-Flex chain made from Acetal plastic. The links are secured with stainless steel pins. Twenty four meters of belt running on four tiers provide the brine shower dwell time that is required.

The brine shower system is composed of a drip pan, a brine tank, a centrifugal pump and a plumbing/brine distribution network. The brine tank is an insulated reservoir for the recirculating brine distribution system. The double walled brine tank is insulated and contains a flow multiplier to agitate the brine and keep the salt in solution. The drip pan runs the length of the system, not occupied by the brine tank. It catches the brine dripping from the sausage and conveyor and allows it to flow back in to the brine tank. The centrifugal pump conveys the brine from the tank through the brine distribution network. The brine is sprayed onto the sausage through nozzles located at many intervals throughout the whole conveyor section.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view of the sausage extruder unit and the associated conveyor;

Fig. 2 is a side elevational view thereof as viewed from the bottom of Fig. 1;

Fig. 3 is a schematic view of the conveyor unit;

Fig. 4 is an enlarged scale perspective view of the conveyor belt; and

Fig. 5 is an enlarged scale sectional view taken on line 5-5 of Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The term "sausage" as used herein refers to any type of emulsified meat product that is formed into sausage or frankfurter links or the like.

The numeral 10 designates a coextruding machine and conveyor. The numeral 12 is a meat emulsion hopper using a meat pump machine for pumping emulsified meat. A collagen gel pump 16 has a hopper 18 for receiving the collagen gel. It is connected by conduit 19 to inline mixer 20. A tube 22 connects the inline mixer 20 to the coextruder 24 which is capable of extruding a cylindrical strand of meat emulsion with a collagen gel material on the outer surface thereof.

Coextruder 24 is connected by tube 25 to the meat pump 14. The conventional coextruded strand of sausage 26 (Fig. 5) has an emulsified meat material core 27 with the collagen gel comprising the outer surface 28 thereof. Liquid smoke from liquid smoke dispenser 30 is used as a coagulation material to coagulate the outer surface 28 of sausage strand 26. The liquid smoke dispenser 30 can be connected in any convenient way such as by line 32 to the inline mixer 20 (Fig. 1).

A conveyor 34 is mounted on frame 36 and has a point of beginning 38 adjacent the output end of coextruder 24, and a discharge station 40 which is located outwardly and downwardly from the point of beginning 38. Three sprockets 42 are rotatably mounted on frame 36 and are adapted to rotate about a horizontal axis. As best shown in Fig. 2, two of the sprockets 42 are vertically disposed with respect to each other below point of beginning 38, and the third sprocket 42 is located on the outer end of a conveyor adjacent discharge station 40.

Two vertical shafts 44 are mounted on opposite ends of frame 36. Each shaft 42 has five rotatably disposed sprockets 46 thereon which are adapted to rotate on shafts 44 about the vertical axis of the shafts. Each set of five sprockets 46 are located in the same parallel plane as one each of the sprockets on the opposite vertical shaft 44. An endless conveyor belt 48 is circuitiously mounted on the sprockets 42 and 46. An infrared heater 50 is mounted on frame 36 adjacent discharge station 40. A drive 51 for the conveyor belt 48 is located adjacent the discharge station 40 as best shown in Figs. 1 and 2.

Belt 48 (Fig. 5) is disposed between a plurality of elongated L-shaped guides 54 which are secured to frame 36. Elongated rails 56 mounted on bearings 58 extend longitudinally through the guides. With reference to Fig. 4, the conveyor belt 48 is comprised of a plurality of belt segments 60 which each have a circular male member 62 at one end thereof with a laterally extending connection slot 64. A semi-circular female slot 66 appears at the end of belt

segment 60 opposite to circular male member 62. Laterally extending apertures 68 extend through the semi-circular female slot 66. Laterally extending pins 70 extend through the aperture 68 and thence through the slot 64 to interconnect the belt segments 60. The apertures 28 permit the belt segment 60 to pivot about the longitudinal axes of aperture 68, and the slot 64 permits the belt segments to have limited pivoted movement about a vertical axis passing through the slot 64 so that the conveyor belt can reverse its direction of travel around sprockets 48. The center portion of each belt segment 60 is comprised of a flat supporting surface 72 which is in the same plane as the upper surfaces of the circular male member 62 and the body of the belt segment surrounding the female slots 66.

With reference to Fig. 2, a brine circuit system 74 includes a brine pump 76. A plurality of miscellaneous control valves 78 are imposed in the brine circuit 74 to selectively control the flow of brine through the system. A fluid line 80 extends from pump 76 and includes a plurality of spaced nozzles 82 which, as discussed hereafter, are located in a plurality of locations on frame 36 directly above the conveyor belt 48 (see Fig. 5) to dispense a spray of fluid brine on the strand of sausage 26.

Brine circuit 74 includes a brine tank 84 which is connected to a brine collection tray 86 located below the various tiers of conveyor belt 48.

A controller 88, such as a computer or the like, is mounted on frame 36 and is connected by line 90 to conveyor drive 51 and is connected by line 92 to coextruder 24. The purpose of controller 88 is to coordinate the discharge speed of the extruded strand of sausage 26 with the speed of the conveyor belt 48 so that the speed of the sausage strand upon discharge is substantially the same speed as the conveyor imparts to the sausage strand once the strand is being conveyed. This prevents the sausage strand from being stretched so as to distort its cross-sectional section while being processed.

In operation, the meat emulsion hopper 12 is charged with a supply of meat emulsion, and the collagen hopper 18 is charged with a quantity of collagen gel. Similarly, the liquid smoke dispenser 30 is charged with liquid smoke so that the liquid smoke is combined with the collagen gel within inline mixer 20.

The mixture of liquid smoke and collagen gel is transmitted through tube 22 to coextruder 24 which conventionally discharges the sausage strand 26 with the center core of meat emulsion 27 in an outer surface comprised of the collagen gel and liquid smoke. The liquid smoke is adapted to coagulate the collagen gel in the presence of air and a brine solution. The strand of sausage 26 is discharged from extruder 24 onto the point of beginning of the conveyor 34. The sausage strand progresses along the moving conveyor belt 48 of the conveyor 34 and is moved under a plurality of the nozzles 82 which spray a quantity of brine on the moving sausage strand.

The controller 88 coordinates the speed of the rate of discharge of the strand of sausage 26 with the longitudinal movement of the conveyor belt 48 as dictated by the conveyor drive 51 so that the elongated strand will not be stretched during its movement.

It should also be noted that the sausage strand rotates slightly from side to side about its longitudinal axes as it progresses downwardly with the conveyor belt 48. This is particularly induced by the configuration of the conveyor belt as it reverses direction. See Fig. 3. This rotation of the sausage strand about its longitudinal axis better permits the brine sprayed from the nozzles 82 to contact all of the outer surface 28 of the sausage strand 26 to enhance the coagulation thereof.

The infrared heater 50 emits heat to stimulate the coagulation of the outer surface 28 as the sausage strand moves therethrough on the conveyor belt 48.

The excess brine from nozzles 82 flows downwardly into the brine collection tray 86, and thence into brine tank 84 wherein the excess brine is recirculated through the system.

The controller 88 is also adapted to cause the strand of sausage 26 to move from the point of beginning 38 to the discharge station 40 in approximately 40 seconds to permit the brine sufficient time to coagulate the outer surface 28 of the sausage strand 26.

When the sausage strand reaches the discharge station 40, the outer surface 28 is sufficiently coagulated to provide strength to the sausage strand where it is discharged into any suitable collection receptacle. The sausage strand can also be formed into a plurality of lengths at that location by conventional structure.

It is therefore seen that the device and method of this invention will achieve at least their principal objectives.

What is claimed is:

1. A method of coagulating the outer surface of an extruded strand of sausage, comprising the steps of: extruding a continuous strand of sausage onto a downwardly sloping moving mechanical conveyor, spraying a brine solution on said strand of sausage along its length as it moves downwardly along the slope of the conveyor, and maintaining said strand of sausage on said conveyor a sufficient length of time to permit the outer surface of said strand of sausage to coagulate.

2. The method of claim 1 wherein the brine sprayed on said strand of sausages is collected after being sprayed and is sprayed on a subsequent sausage strand segment deposited on said conveyor.

3. The method of claim 1 wherein the moving speed of the conveyor is coordinated by the rate at which the sausage strand is deposited on the conveyor to prevent the strand of sausage from being stretched.

4. The method of claim 1 wherein the brine is sprayed on said strand of sausage at a plurality of locations along said conveyor.

5. The method of claim 1 wherein said route of travel of said conveyor is continuous along a serpentine route that proceeds progressively downwardly from a point of beginning in a first direction, and thence downwardly seriately in a second and opposite direction to a discharge station, and thence back to said point of beginning.

6. The method of claim 1 wherein said route of travel of said conveyor is continuous along a serpentine route that proceeds progressively downwardly from a point of beginning in a first direction, and thence downwardly seriately in a second and opposite direction to a discharge station, and

thence back to said point of beginning at a location adjacent the position that said strand is extruded.

7. A conveyor for moving an extruded strand of sausage from an extruding machine, and for coagulating the outer surface of said strand of sausage, comprising, a frame, a continuous conveyor on said frame sloping downwardly from a point of beginning to a discharge station, and thence back to said point of beginning, a brine fluid circuit disposed on said frame above said conveyor with a plurality of discharge nozzles thereon to spray brine on a strand of sausage moving with said conveyor.

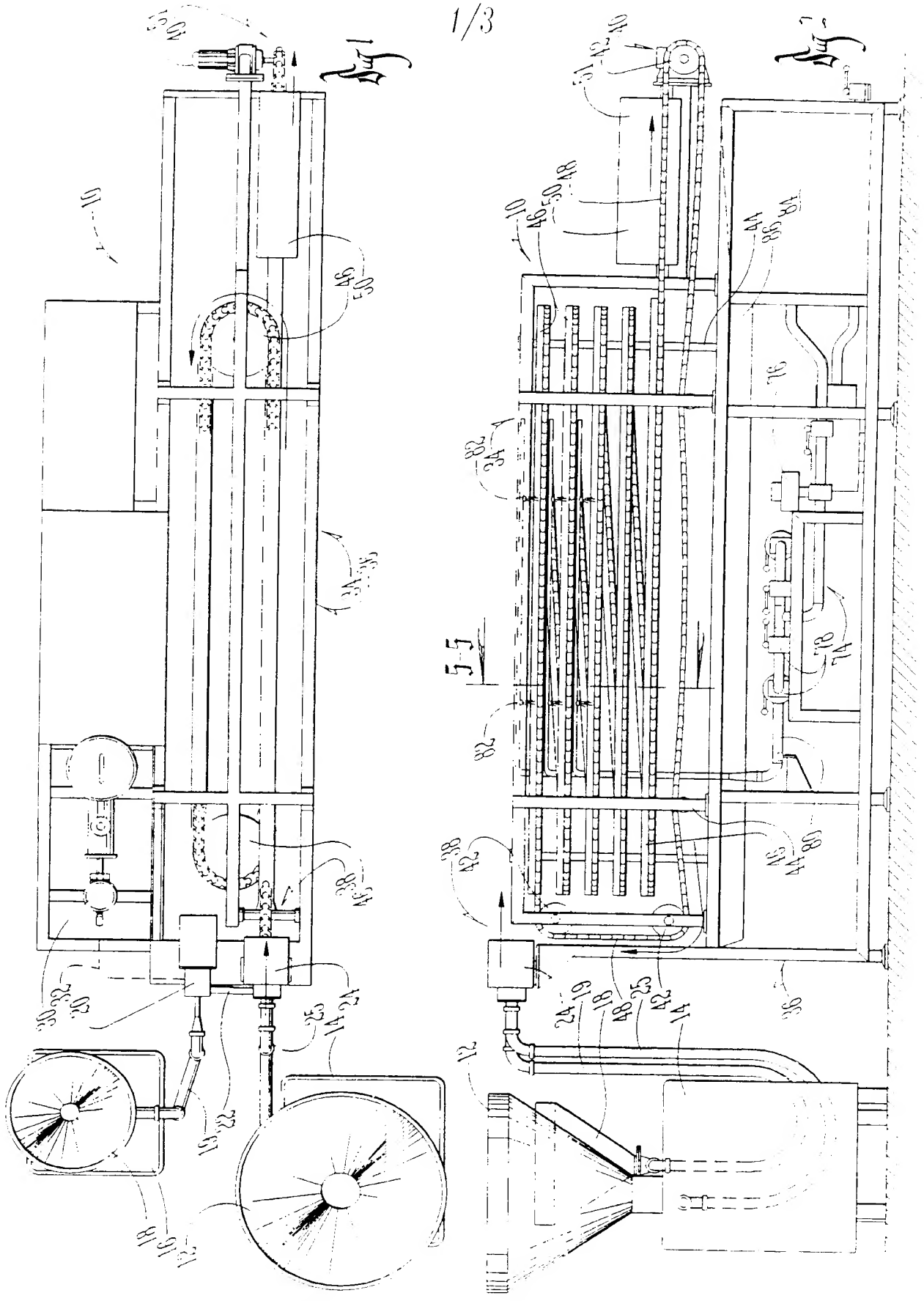
8. The conveyor of claim 7 wherein said conveyor has power means and control means associated therewith and adapted for connection to an extruding machine for extruding a strand of sausage, wherein the speed of said conveyor can be coordinated with the speed at which said strand of sausage is discharged from said extruding machine so that said strand of sausage is not stretched as it moves from said extruding machine onto said conveyor.

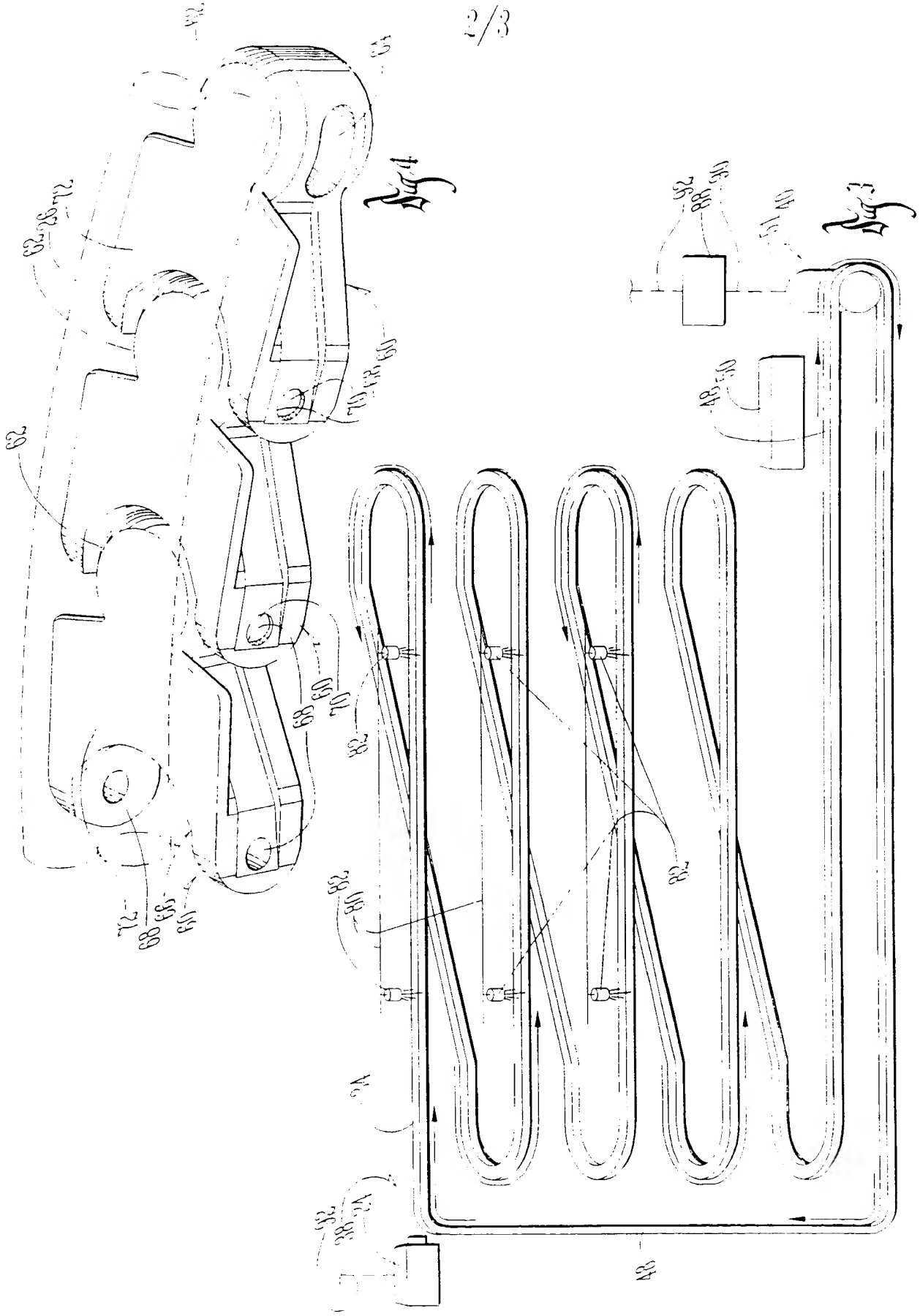
9. The conveyor of claim 7 wherein said conveyor has a continuous conveyor chain which has a supporting surface which has a laterally extending flat surface component which can be turned 180° to reverse its direction of movement and which can be progressively sloped downwardly between said point of beginning to said discharge station.

10. A method of coagulating the outer surface of an extruded strand of sausage, comprising the steps of: extruding a continuous strand of sausage onto a moving mechanical conveyor, spraying a brine solution on said strand of sausage along its length as it moves along the conveyor, and maintaining said strand of sausage on said conveyor a sufficient length of time to permit the outer surface of said strand of sausage to coagulate.

11. A conveyor for moving an extruded strand of sausage from an extruding machine, and for coagulating the outer surface of said strand of sausage, comprising, a frame, a continuous conveyor on said frame extending from a point of beginning to a discharge station, and thence back to said point of beginning, a brine fluid circuit disposed on said frame above said conveyor with a plurality of discharge nozzles thereon to spray brine on a strand of sausage moving with said conveyor.

12. The conveyor of claim 11 wherein said conveyor has power means and control means associated therewith and adapted for connection to an extruding machine for extruding a strand of sausage, wherein the speed of said conveyor can be coordinated with the speed at which said strand of sausage is discharged from said extruding machine so that said strand of sausage is not stretched as it moves from said extruding machine onto said conveyor.





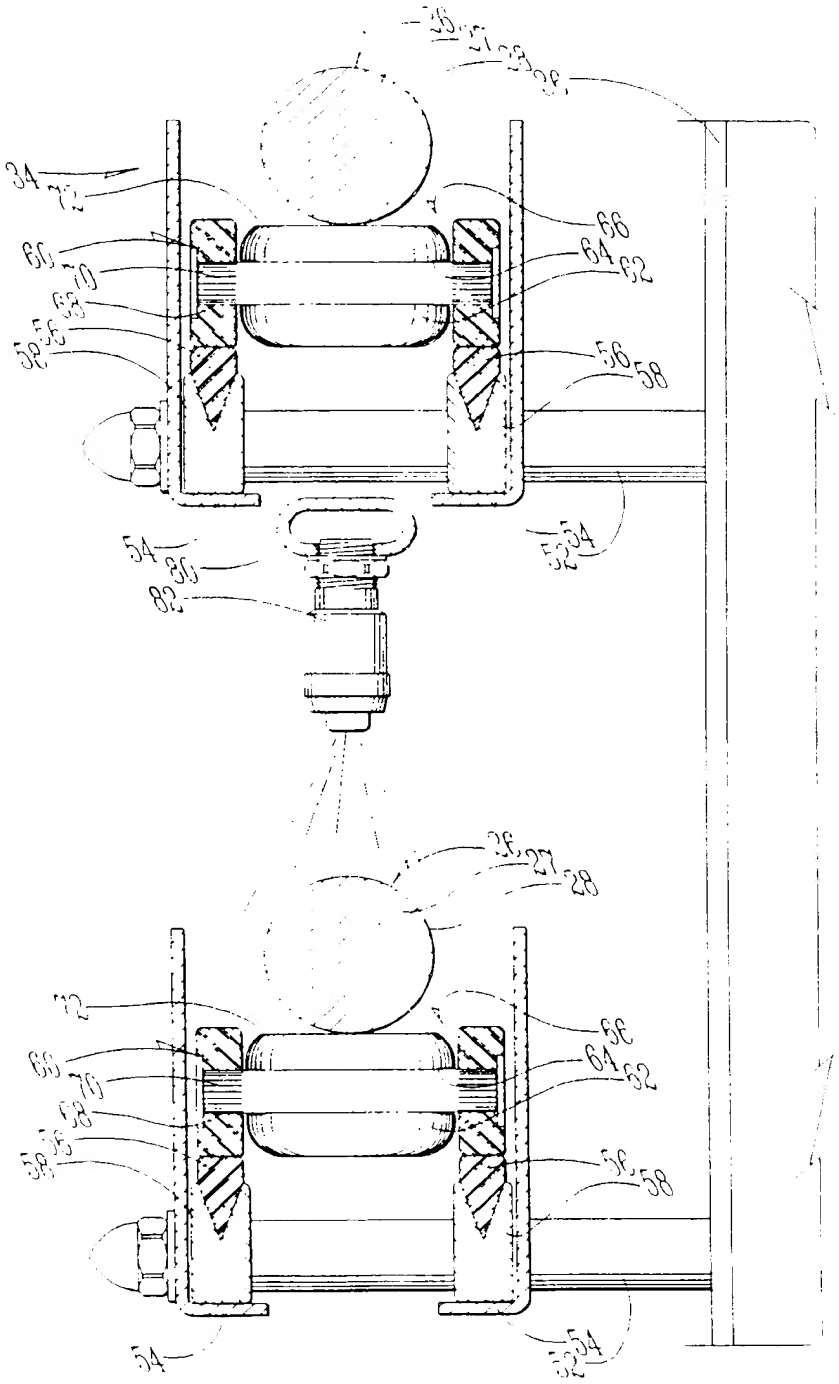


Fig 5

INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/US97/18646

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A22C11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A22C A23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NL 9 201 307 A (MEYN MASCHF) 16 February 1994 see the whole document	1-12
A	DE 11 12 688 B (UNILEVER) 10 August 1961	
A	GB 1 555 801 A (VISKASE) 14 November 1979	
A	NL 265 896 A (EMHART) 16 July 1964	
A	US 3 790 685 A (CRISS W ET AL) 5 February 1974	
A	US 3 620 766 A (WALLACE CHARLES H) 16 November 1971	
A	DE 28 04 184 A (HENNING WOLFGANG) 2 August 1979	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL 9201307 A	16-02-94	NONE	
DE 1112688 B		NONE	
GB 1555801 A	14-11-79	AU 513539 B AU 2145777 A	11-12-80 27-07-78
NL 265896 A		NONE	
US 3790685 A	05-02-74	NONE	
US 3620766 A	16-11-71	NONE	
DE 2804184 A	02-08-79	NONE	

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(54) Title: CO-EXTRUDED COLLAGEN COATED FOODSTUFFS

(57) Abstract

Sausages are produced by co-extruding a uniform layer of acid collagen gel around an extruded edible meat product, and chemically coagulating the co-extruded gel in a bath containing a chemical coagulating agent, such as to provide a collagen casing of sufficient mechanical strength to allow mechanical formation of sausage links by twist-linking or crimping. Preferably a coagulating agent such as liquid smoke is included in the collagen gel prior to extrusion. The coagulating bath may comprise a dehydrating agent such as alkali or a salt solution. No expensive air drying step is required in order to produce continuous casings of good strength.

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CO-EXTRUDED COLLAGEN COATED FOODSTUFFS

The invention relates to a process and apparatus for the production of co-extruded collagen coated foodstuffs such as sausages.

While the process relates particularly to the production of sausages, it may also be used in the production of other collagen coated foodstuffs such as fish or meat products or products containing vegetable or cheese or both. Thus, while the description of the process will be in terms of the production of strings of sausages, the process is clearly not limited to that particular foodstuff.

There are known processes of co-extruding sausages or sausage-like materials. One particular process is disclosed in patent specification GB1232801. Essentially, the process involves extruding a cylindrical core of sausage meat mix and simultaneously extruding around the sausage meat an outer casing of a collagen gel. The collagen gel has a high water content and the gel is coagulated by removal of some of the water by osmosis by passage through a concentrated sodium chloride bath. However, coagulation of the collagen casing is not complete at this stage so that the casing is relatively weak in terms of mechanical properties. In particular, there would not generally be sufficient strength to enable crimping or twist linking to take place. In the conventional process, the co-extruded sausage is then cut

into individual sausages which are transported to a hot air drying cabinet where the hardening of the casing is completed and at the same time some partial cooking of the sausage meat occurs.

This process is thus not suitable for the production of twist link sausages. At the end of the brine bath, the collagen casing has insufficient strength to allow twist linking to be successfully carried out. On the other hand, after completion of hardening of the casing, partial cooking of the sausage meat has occurred. A partially cooked sausage is unsuitable for twist linking, due to solidification of the sausage meat.

A further disadvantage of the conventional process is that the air drying stage is costly in terms of energy consumption.

Japanese patent application 63-219473 (publication H2-69139) suggests the addition of a liquid smoke solution into the collagen gel immediately prior to co-extrusion in order to overcome problems of splitting of the sausage casing during the air drying stage.

It is an object of the present invention to mitigate these problems and provide a process which avoids the costly air drying stage, and also allows the production of twist linked strings of sausages.

The present invention provides a process of producing co-extruded sausage which comprises:

- co-extruding a substantially uniform layer of collagen gel around an extruded edible product; and
- chemically coagulating the co-extruded collagen gel using a chemical coagulating agent in the absence of heated air drying, such as to provide around the edible product a coagulated collagen casing of sufficient strength to allow mechanical separation into sausage links.

The invention also provides a corresponding apparatus for carrying out the process; and to the product itself.

The term "coagulating" is a term of art in the production of collagen coated sausage material and is not strictly scientific in the sense in which it is used. Coagulating as used in this specification refers to the step involving hardening and stabilisation of the casing. This is principally achieved in two ways; firstly by removal of water from the collagen gel, and secondly by cross-linking the collagen. Either or both of these methods may be employed as appropriate.

Thus, it is known that collagen is a protein able to form aqueous gels of high water content. Typically, maximum gel water uptakes can be achieved at a pH of around 2 and a pH of around 13 which correspond roughly to the points of maximum swelling of the collagen protein. Higher water uptakes are generally found in the acid

region and for this reason acid collagen gels are often used for extrusion purposes. Thus, coagulation of the collagen can be brought about by water removal from the gel, for example by the use of concentrated salt solutions (such as sodium chloride) which remove water by osmosis, or by the use of a solution which changes the pH of the collagen gel such that water is lost from the gel. Thus, one embodiment of the present invention, envisages the use of an acidic gel and an alkaline coagulation agent which neutralises the acid and leads to water loss in the gel (for example, a solution of sodium hydroxide, sodium carbonate, ammonium sulphate, sodium bicarbonate, or ammonium hydroxide; or even by means of gaseous ammonia).

Alternatively or additionally, coagulation may be brought about by means of chemical modification of the collagen, such as by cross-linking. Suitable chemical modification systems include the use of glutaraldehyde, glyoxal, liquid smoke, sugars and mineral tanning agents. Liquid smoke is a well known material in the art and is for example described in patent GB1432271. Modification of the collagen casing may be brought about by proteolysis, caramel addition, or by the use of modified polysaccharides, for example propylene glycol alginate or hydroxy propyl methyl cellulose. Cellulose fiber may also be added for certain cooking properties.

Certain chemical modifying agents are suitable for inclusion in the gel prior to extrusion, particularly

cross-linking agents such as glutaraldehyde, and liquid smoke. Vegetable oil may be included in the gel to control coagulation and surface characteristics (such as clarity and permeability). According to a preferred embodiment of the invention, a coagulating agent which is a cross-linking agent (such as glutaraldehyde, glyoxal, liquid smoke, sugars and mineral tanning agents) is included in the collagen gel prior to extrusion, and the co-extruded collagen casing is then subject to coagulation by water loss in the post extrusion bath. This enables a coagulated collagen casing of sufficient strength to be produced, which may be twist-linked, crimped or otherwise mechanically separated into sausage links without breakage or disintegration.

The preferred chemical coagulating bath has a pH in the range 8 to 12, and preferably 9 to 10; and a temperature of 5 to 45°C, preferably 35 to 40°C.

The process is much less costly than the standard processes because it omits the expensive and time consuming mechanical drying. Air drying is the most usual form of drying employed in conventional co-extrusion processes and it is the main feature which limits the speed of the process. Thus, the present invention not only produces a product which can be directly handled and/or hung but one which is much cheaper to operate than known co-extrusion processes.

Preferably, the collagen gel is an acidic gel at a pH

of 1 to 4. Usually, the gel comprises 90 to 95% water. The collagen gel may be cooled to a temperature of 4 to 16°C prior to extrusion.

A preferred collagen gel comprises 4 to 10% collagen, 0.1 to 2% cellulose, 0.05% to 0.5% hydrochloric acid, preferably 0.3%, the balance being water.

Colouring agents may be included in the casing, for example by incorporating a colouring agent in the gel itself, or within a crosslinking agent (such as liquid smoke) injected into the gel prior to extrusion. Alternatively, the colouring agent may be injected independently into the gel prior to extrusion thereof.

The co-extruded edible product may also be coloured if desired, depending on the desired appearance characteristics.

Suitable colouring agents are well known in the art and include, for example, annato, sunset yellow, curcumin, cochineal, tartrazine yellow etc.

Usually, the amount of collagen gel co-extruded around the edible product is 3 to 10% of the total weight of gel and edible product. Preferably, the finished coagulated collagen gel casing has a thickness of 10 to 30 microns. The thickness is generally in proportion to the diameter of the sausage.

Usually, a coagulation time of 5 to 300 seconds is employed in order to allow coagulation to be substantially completed. This is preferably achieved by passing the

co-extruded product from the coagulation baths into a holding chamber, such as a spiral trough or flume downstream with the coagulating bath to allow substantial completion of coagulation. Further coagulating solution or other treatment solutions may be passed concurrently down the flume or showered thereinto. The co-extruded product is then preferably washed prior to separation into linking.

In a modification of the process, after the chemical coagulating bath, the product was subjected to chemical dehydration employing a chemical dehydrating agent, such as sodium carboxymethyl cellulose, 0.1 to 2% solution and preferably 1% solution.

The process according to the present invention allows the continuous non-batch production of linked sausages, which has not been possible hitherto. Thus, conventional link sausages are produced in batch mode using discrete lengths of preformed natural or reconstituted collagen casings placed on a stuffing horn. The conventional arrangement does not allow the production of continuous lengths of linked sausage. Thus, the present invention is well suited to industrial production and packaging techniques.

An embodiment of the invention will now be described by way of example only in conjunction with Figure 1 which is a schematic flow chart of a process and apparatus according to the invention.

A sausage meat paste mix is delivered from a vacuum filler 2 (e.g. a Handtmann FA30 or PA30) by a meat metering pump 4 to a co-extruder 6. An acid collagen gel is delivered from a gel storage vessel 8 by means of a gel metering pump 10. The gel storage vessel is usually pressurised to assist delivery of the gel, which has been prepared from hide splits, homogenised and filtered according to known technology.

Liquid smoke (or other cross-linking agent) from a container 12 is metered by a metering pump 14 into the collagen gel prior to co-extrusion.

The co-extruder may be of a design known in the art such as a conical extruder or a contra-rotating disc extruder such as disclosed in patent specification US 3122788. The co-extruder extrudes a core of sausage meat through a central round die, and extrudes simultaneously a coating of collagen gel onto the meat core via an annular die surrounding the central round die.

The co-extruded coated sausage meat passes into a coagulation treatment bath 16 which comprises a shallow stainless steel trough having therein a conveyor formed of wire links to enable coagulation solution to freely contact the co-extruded collagen coating. Typically the trough is 2 to 10 m long in order to provide the desired residence time. Part of the coagulation solution is bled off and replaced by fresh solution from a feed stock tank 18 supplied from a make-up tank 20 in order to maintain

correct concentrations in the solution.

In order to allow coagulation to be completed the co-extruded sausage is then passed into a spiral solution trough 22. The trough 22 is a spiral or a helical flume (length 10 to 50 m) in order to provide the desired residence time in a compact arrangement. Usually the co-extruded sausage is fed into an upper end and passes down by gravity. A haul-off (not shown) may be provided at the downstream end. As required, further coagulating solution and/or washing solution may be passed down the flume (or showered onto the sausage) in order to complete the treatment.

At this stage the coagulated collagen sausage casing has a strength which is substantially its finished strength and is adequate to allow conventional twist-linking or crimping in linker 24. The collagen casing is strong enough to be twisted or crimped. Equally, the co-extruded sausage may be cut into individual sausages at this point if desired. The sausage meat paste inside is, however, still fluid enough to be displaced during the twisting or crimping operation (in contrast to the conventional process where full strength in the casing is only achieved after air drying and partial cooking and solidification of the sausage meat paste).

The twist-linked or crimped sausage string may then be hung and smoked in cabinet 26 according to conventional practice.

EXAMPLES

The following Examples illustrate the invention and were carried out by extrusion of a central core of sausage meat mixture typically of pH5 at about 4°C, and co-extrusion of a collagen gel through an annular die around the central core. The collagen gel was typically an acid gel of pH2 to 3 at a temperature of about 6°C. The co-extruded product was usually led into a sodium carbonate coagulation bath which typically increased the pH of the collagen gel casing to around pH10 to 11 thereby dewatering the gel. The tensile strengths were measured after substantial completion of coagulation of the collagen casing. Any liquid smoke was metered into the gel upstream of the co-extruder head.

EXAMPLE 1 (Varying Coagulation Time)

The experimental conditions were as follows:

extrusion speed = 9.75 m/minute

gel type = 4.7% collagen, 5.8% solids

gel quantity = 170 g/minute

extrusion calibre = 16mm

coagulation solution = 16.7% w/w aqueous sodium carbonate at 18°C.

The results are given in Table 1. Tensile strengths of at least 1.0kg would generally be required to produce an acceptable product. The bursting calibre is obtained by squeezing the sausage meat up and so expanding the casing until it bursts.

TABLE 1

Contact Time with Coagulation Solution	Bursting calibre (mm)	Tensile Strength (kg) (Extrusion Direction)
16 sec	20-22	0.323
26 sec	20-21	0.273
46 sec	21	0.312

EXAMPLE 2 (sodium carbonate and glutaraldehyde coagulating agents)

The experimental conditions were as follows:

extrusion speed = 9.14m/minute

gel type = 4.7% collagen, 5.8% solids

gel flow rate = 200g/minute

extrusion calibre = 18-19mm

The results are given in Table 2.

TABLE 2

Solution Type	Contact Time of Solution (sec)	Tensile Strength (kg) (extrusion direction)
22% w/w Na_2CO_3 at 35°C	16	0.616
	26	0.681
	36	0.887
22% w/w Na_2CO_3 + 500ppm Glutaraldehyde at 35°C	16	0.888
	26	1.130
	36	1.215

EXAMPLE 3 (liquid smoke in collagen gel)

The experimental conditions were as follows:

extrustion speed = 9.14 m/min

gel type = 4.7% collagen, 5.3% solids

extrusion calibre = 26mm

coagulation solution = 21% w/w sodium carbonate @ 33-44°C

contact time with solution = 40 seconds.

Liquid smoke was injected directly into the gel stream upstream of the co-extruder.

The results are given in Table 3.

TABLE 3

Smoke type	Smoke level (% of gel volume)	Bursting calibre mm	Tensile Strength kg (Extrusion direction)
Zesti 10DC	10	29-31	1.15
Imperial 400N	10	30-31	1.08
Zesti 10DC	5	29-30	1.07
Imperial 400N	5	29-30	1.05
Imperial 1000P	5	28-30	1.08

EXAMPLE 4 (varying gel)

The experimental conditions were as follows:

extrusion speed = 9.14m/min

gel type = 6.0% collagen 6.4% solids

extrusion calibre = 19mm

coagulation solution = 21% w/w sodium carbonate

Direct injection of Zesti 10 liquid smoke into gel stream.

Contact time with solution = 40 seconds

The results are given in Table 4.

TABLE 4

Gel usage g/min	Extruder direction Tensile Strength (kg)
120	1.08
148	1.28
170	1.44
190	1.64

EXAMPLE 5 (varying extruder disc speed)

The experimental conditions were as follows:

extrusion speed = 15.24m/min

gel type = 6% collagen 5.4% solids

extrusion calibre = 19mm

coagulation solution = 21% w/w sodium carbonate at 40°C

Direct injection of Zesti 10 liquid smoke into gel stream at 5% w/w on gel flow rate of 200g/min.

The results are given in Table 5.

TABLE 5

Disc speed of extruder	Bursting calibre (mm)	Extruder Direction tensile strenth (kg)
60rpm	25-26mm	1.808kg
96rpm	26-27mm	1.959kg
124rpm	26-27mm	2.035kg
184rpm	26mm	1.690kg
240rpm	25-26mm	1.26kg

EXAMPLE 6 (varying extruder disc speed)

The experimental conditions were as follows:

extrusion speed = 41.15m/min

gel type = 4.7% collagen 5.8% solids

extrusion calibre = 19mm

coagulation solution = 21% w/w sodium carbonate at 40°C

gel flow rate = 522g/min.

Direct injection of Zesti 10 liquid smoke into gel stream at 5% w/w.

The results were as follows:

(a) Extruder disc speed at 265rpm - tensile = 1.866kg (± 0.254kg)
bursting calibre = 24mm

(b) Extruder disc speed at 302rpm - tensile = 2.152kg (± 0.131)
bursting calibre = 24mm.

EXAMPLE 7 (mixed coagulation agents)

The experimental conditions were as follows:

extrustion speed = 15.2m/min

gel flow rate = 199g/min

gel type = 4.7% collagen 5.6% solids

5% by volume at Zesti 10 liquid smoke addition to gel stream.

coagulation time = 40 seconds

coagulation temperature = 40°C

The results were as follows:

(a) Coagulation solution composition = 21% w/w aqueous sodium carbonate.

Extrusion direction tensile strength = 2.212kg (± 0.214kg)

(b) Coagulation solution composition = 18% NaCl and 9.6% Na_2CO_3 by weight.

Extrusion direction tensile strength = 2.055kg (± 0.268kg).

CLAIMS

1. A process of producing co-extruded sausage which comprises;

- co-extruding a substantially uniform layer of collagen gel around an extruded edible product; and
- chemically coagulating the co-extruded collagen gel using a chemical coagulating agent in the absence of heated air drying, such as to provide around the edible product a coagulated collagen casing of sufficient strength to allow mechanical formation of sausage links.

2. A process according to claim 1 wherein the collagen gel is an acid gel at a pH of 1 to 4.

3. A process according to any preceding claim wherein the collagen gel is at a temperature of 4 to 16°C prior to extrusion.

4. A process according to any preceding claim wherein a further chemical coagulating agent is incorporated into the collagen gel prior to extrusion.

5. A process according to claim 4 wherein the further chemical coagulating agent is liquid smoke.

6. A process according to any preceding claim wherein chemical coagulating agent in the bath is selected from

(i) a salt solution such as to dehydrate the collagen casing by osmotic water loss;

(ii) an alkali such as to promote dehydration of the collagen casing by pH change; or

(iii) a chemical cross-linking agent.

7. A process according to claim 6 wherein the chemical coagulating agent comprises an aqueous alkali solution of sodium carbonate at a pH of 9 to 13.

8. A process according to any preceding claim wherein the coagulation time is in the region 5 to 300 seconds.

9. A process according to any preceding claim wherein the amount of collagen gel co-extruded around the edible product is 3 to 10% of total weight of co-extruded sausage.

10. A process according to any preceding claim wherein the coagulated collagen casing has a thickness of 10 to 30 microns.

11. A process according to any preceding claim which includes the further step of mechanically forming into sausage links by crimping or twist-linking.

12. A process according to any preceding claim wherein a colouring agent is included or injected in the gel prior to extrusion.

13. A process according to any preceding claim wherein a colouring agent or combination with a cross-linking agent is included or injected in the edible product prior to extrusion.

14. An apparatus for producing co-extruded sausages which comprises;

- means for co-extruding a substantially uniform layer of collagen gel around an extruded edible product; and
- a liquid coagulating bath containing a chemical coagulating agent for chemically coagulating the co-extruded collagen gel in the absence of hot air drying.

15. An apparatus according to claim 14 which further comprises a holding chamber disposed downstream of the coagulating bath for allowing substantial completion of coagulation of the collagen casing.

16. An apparatus according to claim 15 wherein the holding chamber is in the form of a helical flume, down which a treatment liquid may be flowed.

17. An apparatus according to any of claims 14 to 16 which further comprises means for mechanically forming into sausage links by crimping or twist-linking.

18. A co-extruded sausage which comprises an elongate extruded edible product having therearound a coagulated extruded collagen gel casing, the casing incorporating a cross-linking agent and having been chemically coagulated.

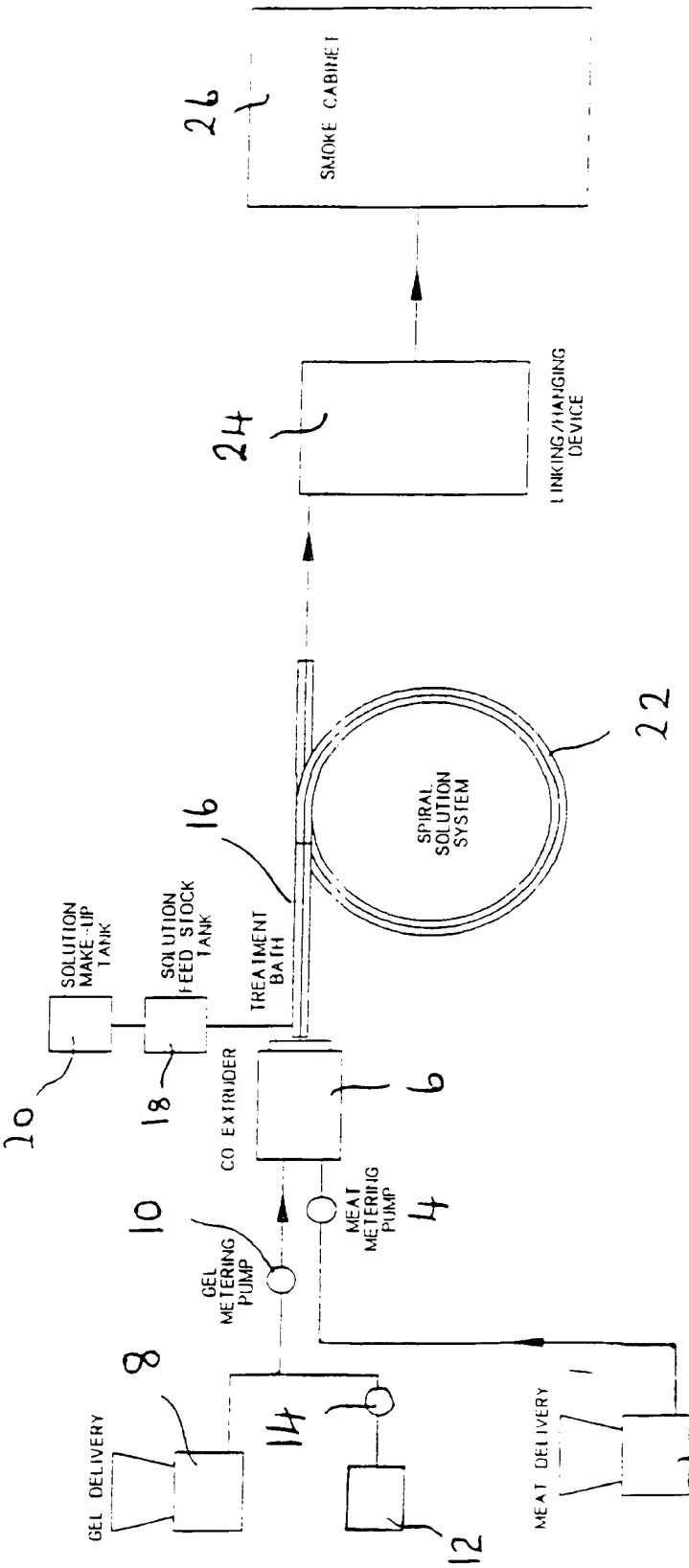
SMOKE CABINET
26
LINKING/HANGING DEVICE
24
SPIRAL SOLUTION SYSTEM
22
16
SOLUTION MAKE-UP TANK
SOLUTION FEED STOCK TANK
TREATMENT BATH
20
18
CO EXTRUDER
6
GEL METERING PUMP
10
MEAT METERING PUMP
4
GEL DELIVERY
8
14
12
MEAT DELIVERY
2

Fig 1

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 92/02381

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]
According to International Patent Classification (IPC) or to both National Classification and IPC
Int.Cl. 5 A22C13/00

II. FIELDS SEARCHED	
Minimum Documentation Searched[7]	
Classification System	Classification Symbols
Int.Cl. 5	A22C
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]	

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	Derwent Publications Ltd., London, GB; AN 90-119470 & JP,A,2 069 139 (NIPPON HAM KK) 8 March 1990 cited in the application see abstract	1
A	US,A,3 622 353 (N. J. BRADSHAW) 23 November 1971 see claims 1-5; examples 2,3 & GB,A,1 232 801 (UNILEVER LTD.) 19 May 1971 cited in the application	1
A	EP,A,0 083 126 (VAESSEN-SCHOEMAKER HOLDING B.V.) 6 July 1983 see claims 1-14	1

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° Special categories of cited documents : [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
15 APRIL 1993	19. 05. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	PERMENTIER W.A.

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	FR,A,2 226 932 (DEVRO, INC.) 22 November 1974 see claims 1-17	1,4,5
A	US,A,2 988 451 (H. ZAHN) 13 June 1961 see the whole document	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9202381
SA 67871

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 15/04/93
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3622353	23-11-71	BE-A- 734585	15-12-69
		DE-A,B,C 1930887	08-01-70
		FR-A- 2011148	27-02-70
		GB-A- 1232801	19-05-71
		NL-A- 6909339	22-12-69
EP-A-0083126	06-07-83	NL-A- 8105898	18-07-83
		AU-B- 537381	21-06-84
		AU-A- 9178582	11-08-83
		CA-A- 1189381	25-06-85
		JP-C- 1558779	16-05-90
		JP-A- 58160324	22-09-83
		JP-B- 63060972	28-11-88
		US-A- 4476072	09-10-84
FR-A-2226932	22-11-74	US-A- 3894158	08-07-75
		AT-B- 351345	25-07-79
		AU-B- 476319	16-09-76
		AU-A- 6760174	09-10-75
		BE-A- 814134	24-10-74
		CA-A- 1023608	03-01-78
		CH-A- 602018	14-07-78
		DE-A- 2419559	21-11-74
		GB-A- 1432271	14-04-76
		JP-A- 50012257	07-02-75
		NL-A- 7405525	28-10-74
US-A-2988451		None	